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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 138)

FEBRUARY 1975

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NASA SP-7011(138)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 138)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in January 1975 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 343 reports, articles and other documents announced during January 1975 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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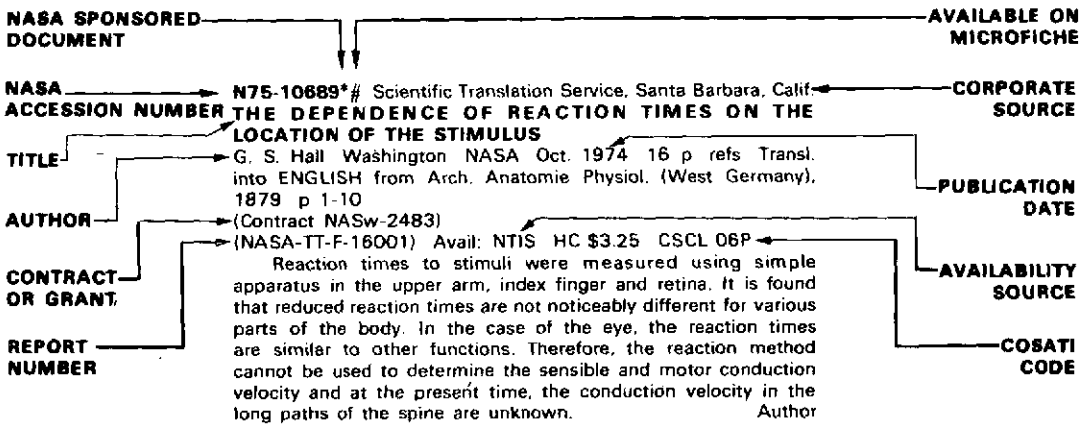

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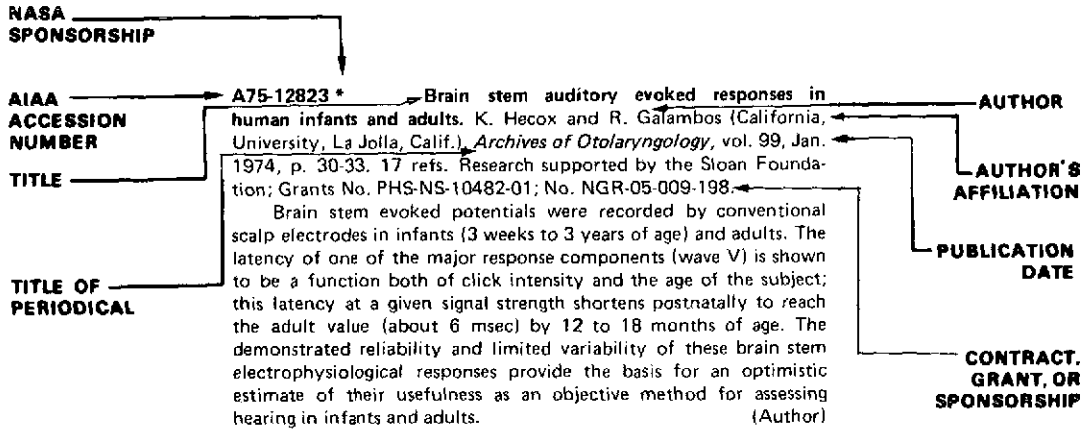

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 138) **FEBRUARY 1975**

IAA ENTRIES

A75-10024 # **The formation of special skills for actions in a complicated situation (Formirovanie spetsial'nykh navykov k deistviiam v usłozhnennoi obstanovke).** N. M. Rudnyi and V. A. Ponomarenko. *Voenno-Meditsinskii Zhurnal,* July 1974, p. 52-56. In Russian.

The present work discusses some general psychological and behavioral concepts for the elucidation of the mental and motor activities of aircraft pilots in nonstandard situations. Three components are seen as taking part in the control of actions on the pilot's part: the orientational reflex, the dynamic stereotype, and the dominant. The orientational reflex arises when a discrepancy between an expected and a real event is noticed. As the pilot focuses his attention on identifying the cause of the discrepancy, the flow of his activity is inhibited. The dynamic stereotype reflects the tendency towards reproducing a previously formed system of reactions, and therefore leads to 'automation' of action. The dominant state appears as the physiological basis for the level of concentration of attention. Studies have shown that two-thirds of the time spent in handling a nonstandard situation is used just in assessing the nature of it. Therefore, it is not so much the development of automatic motor reactions which should be stressed, as the development of intellectual skills. P.T.H.

A75-10025 # **Collapsible portable electrically turned chair for vestibular measurements (Razbornoe portativnoe elektrovrashchaiushcheesia vestibulometricheskoe kreslo).** S. S. Markarian, I. A. Sidel'nikov, O. V. Sokolov, and N. V. Dudnikov. *Voenno-Meditsinskii Zhurnal,* July 1974, p. 74, 75. In Russian.

A75-10039 **Computerized transaxial X-ray tomography of the human body.** R. S. Ledley, A. J. Luessenhop, H. L. Twigg (Georgetown University, Washington, D.C.), and G. Di Chiro (National Institutes of Health, Bethesda, Md.; Georgetown University, Washington, D.C.). *Science,* vol. 186, Oct. 18, 1974, p. 207-212. 10 refs. Research supported by the National Biomedical Research Foundation.

A new X-ray scanner, the Automatic Computerized Transverse Axial Scanner (ACTA-Scanner) is described. The ACTA-Scanner has virtually unlimited potential in the evaluation of any part of the body. The usefulness of the technique has already been shown in the appraisal of pathologies of the brain and cerebrospinal fluid cavities. The orbits and the eyeballs, the facial sinuses, and skull base lesions have also been elucidated. With the ACTA-Scanner, as the highly collimated X-ray beam traverses the body, some photons are absorbed, while others pass through and are detected by a sodium iodide crystal. The absorption along any path depends on the sum of the absorption coefficients of the tissues through which the beam passes. F.R.L.

A75-10046 **Vitamin E, exercise, and the recovery from physical activity.** R. J. Shephard, R. Campbell, P. Pimm, D. Stuart, and G. R. Wright (Toronto, University, Toronto, Canada). *European Journal of Applied Physiology,* vol. 33, no. 2, 1974, p. 119-126. 26 refs.

A matched-pair trial under near double-blind conditions has tested the physiological effects of an 85-day-course of d-alpha tocopherol acid succinate (1200 I.U./day) in 20 university class swimmers. Valid comparisons were possible in seven of the ten pairs. These showed good initial matching of maximum oxygen intake, recovery curves, muscle strength, and ECG waveform. Despite a substantial yardage of swimming training (about 20,000 yards/week), neither test nor control groups improved their aerobic power. However, both groups showed a reduction in the lactate component of the oxygen debt, with a faster pulse recovery curve. Muscle strengths tended to decline, the loss of handgrip strength being significant in the control group. No change of ECG waveform was observed other than a small increase of T wave height in the controls. It is concluded that the swimmers gained no advantage from the vitamin E, although it could conceivably have helped maintain equality of status in the face of a slightly smaller weekly yardage than that of the control group. (Author)

A75-10047 **Relationship of pulmonary diffusing capacity /D sub L/ and cardiac output /Q sub c/ in exercise.** G. M. Andrew and L. Baines (Queen's University, Kingston, Ontario, Canada). *European Journal of Applied Physiology,* vol. 33, no. 2, 1974, p. 127-137. 31 refs. Research supported by the Department of National Health and Welfare, Provincial Public Health, and Ontario Heart Foundation.

Investigation of the interrelationships of pulmonary diffusing capacity for CO, pulmonary capillary blood flow, oxygen uptake, and related functions in exercise. Six young adult men were tested on a bicycle ergometer on 9 to 20 occasions at various intensities of exercise up to the maximal level that could be sustained for 5 min. Measurements at each exercise level included work load (kgm/min), heart rate, minute ventilation, pulmonary capillary blood flow, pulmonary diffusing capacity for CO and oxygen uptake. Using regression analysis, it was established that the capillary blood flow and the diffusing capacity increased linearly with oxygen uptake throughout the work range in each subject, and no tendency toward a plateau was observed. While the maximal value varied from subject to subject, there was no difference between individuals in the coefficient describing the relationship between these three parameters. (Author)

A75-10048 **Regional blood flow responses to hypoxia and exercise in altitude-adapted rats.** A. Tucker and S. M. Horvath (California, University, Santa Barbara, Calif.). *European Journal of Applied Physiology,* vol. 33, no. 2, 1974, p. 139-150. 32 refs. Grant No. AF-AFOSR-73-2455.

Regional blood flow, determined as the fractional distribution of Cs-137, was measured at rest and during swimming exercise in control rats raised at sea level and in rats altitude-adapted by exposure to a barometric pressure of 440 mm Hg for approximately six weeks. During both normoxic and hypoxic (11% O2) resting conditions, the altitude-adapted rats exhibited regional distributions of blood flow that differed significantly from those in the control

animals. During normoxic and hypoxic swimming, significant redistributions of blood flow were noted in the control animals compared to the resting conditions. Ventricular, diaphragmatic, and working muscle blood flows were increased at the expense of the renal and splanchnic circulations, with a more marked redistribution during the hypoxic swims. Similar redistributions of blood flow were exhibited by the exercising altitude-adapted rats, except that renal and hepatic perfusion was maintained at a significantly higher level during both the normoxic and hypoxic swims. (Author)

A75-10049 **Evaluation of vibration mixtures affecting humans through seat surfaces (Zur Beurteilung von Schwingungsgemischen, die über die Sitzfläche auf den Menschen einwirken).** W. Lange (Max-Planck-Institut für Systemphysiologie, Dortmund, West Germany). *European Journal of Applied Physiology,* vol. 33, no. 2, 1974, p. 151-170. 19 refs. In German.

Subjects were exposed to vibrations which consisted of several harmonics. The subjects had to compare the combination of harmonics with a sinusoidal reference vibration of 5 Hz. The amplitude of this reference frequency was varied until the subject felt an equal stress by the combined vibration and the sinusoidal one. By this procedure amplitudes of the reference vibration were found by which the response of combined vibrations was described numerically. Thus, the influence of harmonics in the vibrations on subjective response could be ascertained quantitatively. The tests were carried out with vibrations, which included first harmonics between 2 and 8 Hz. If there were discrete frequencies in the spectrum, which belonged to the main resonance frequency-range of man (about 5 Hz), these components alone were decisive for the subjective response. If the fundamental frequency was below 5 Hz, the second and third harmonics had an essential influence on the subjective response, while harmonics higher than the second one were of no importance when the first harmonic was between 5 and 8 Hz. (Author)

A75-10050 **A 1-minute bicycle ergometer test for determination of anaerobic capacity (Minutentest auf dem Fahrradergometer zur Bestimmung der anaeroben Kapazität).** A. Szogy and G. Cherebetiu (Centrul de Medicina Sportiva, Bucharest, Rumania). *European Journal of Applied Physiology,* vol. 33, no. 2, 1974, p. 171-176. 12 refs. In German.

A total of 236 high performance athletes from 15 different sports branches were submitted to a 1-minute test to measure their anaerobic capacity. The test consisted basically in obtaining as many rotations as possible on a bicycle ergometer. The parameters measured in the test were total work performed and oxygen deficit. With a mean anaerobic rate of 74.4% the test can be considered as a method for measuring the global anaerobic capacity. The highest values of the parameters measured were obtained from sportsmen using mainly the lower extremities in their sports branches. This means that the test is limited to these sports branches. The total work performed and the oxygen deficit were found to correlate highly significantly. Thus the anaerobic capacity may be estimated from measured values of the total work performed in laboratories where no equipment for measuring gas exchanges is available. (Author)

A75-10078 * **Induction of chronic growth hormone deficiency by anti-GH serum.** R. E. Grindeland, A. T. Smith, S. Ellis (NASA, Ames Research Center, Biochemical Endocrinology Branch, Moffett Field, Calif.), and E. S. Evans. *Endocrinology,* vol. 95, Sept. 1974, p. 793-798. 16 refs.

The observations reported indicate that the growth rate of neonatal rats can be specifically inhibited for at least 78 days following the administration of antisera against growth hormone (GH) for only four days after birth. The inhibition can be correlated with a marked deficit of tibial growth promoting activity in the pituitary but not with the plasma concentrations of immuno-reactive GH. G.R.

A75-10175 **Effect of beta-adrenergic stimulation on myocardial adenine nucleotide metabolism.** H.-G. Zimmer (München, Universität, Munich, West Germany) and E. Gerlach (Rheinisch-Westfälische Technische Hochschule, Aachen, West Germany). *Circulation Research,* vol. 35, Oct. 1974, p. 536-543. 39 refs. Deutsche Forschungsgemeinschaft Grant No. Ge-129/8.

A75-10176 **Increased metabolic turnover rate and transcapillary escape rate of albumin in essential hypertension.** H.-H. Parving, N. Rossing, and H. A. Jensen (Bispebjerg Hospital; Diakonissestiftelsen, Copenhagen, Denmark). *Circulation Research,* vol. 35, Oct. 1974, p. 544-552. 37 refs. Research supported by the Danish Heart Foundation.

A75-10177 **Central and reflex regulation of sympathetic vasoconstrictor activity to limb muscles during desynchronized sleep in the cat.** G. Baccelli, G. Mancia, A. Zanchetti (Milano, Università; CNR, Centro per le Ricerche Cardiovascolari, Milan, Italy), and R. Albertini (Universidad Católica, Santiago de Chile, Chile). *Circulation Research,* vol. 35, Oct. 1974, p. 625-635. 30 refs.

A75-10214 # **Large systems with periodical structure and function /example in cellular tissue/. I - Formalism of structure and function: Spatial lattices and cellular automata (Bol'shie sistemy s periodicheskoi strukturoi i funktsiei /na primere kletochnoi tkani/. I - Formalizm struktury i funktsii: Prostranstvennye reshetki i kletochnye avtomaty).** L. Reshod'ko (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Kybernetika,* vol. 10, no. 5, 1974, p. 409-423. 9 refs. In Russian.

A cellular automaton is developed as a model for the description of myogenic tissue. Experiments utilizing machines with cellular space corresponding to smooth muscle tissue showed that large systems with periodically distributed structure and function possess characteristics which allow for self-organized behavior. The paper provides a detailed outline showing the system in terms of a spatial lattice and includes a programmed simulation of the system with results of machine experiments. The nature of the structural model of the smooth muscle tissue may have an acceptable three-

A75-10231 **CNS regulation of body temperature in euthermic hibernators.** H. C. Heller, G. W. Colliver, and P. Anand (Stanford University, Stanford, Calif.). *American Journal of Physiology,* vol. 227, Sept. 1974, p. 576-582. 15 refs. Grants No. NIH-5-R01-NS-10367-01; No. NIH-RR-07-005-06.

Reported experiments on Belding and golden-mantled ground squirrels, using thermodes implanted in the preoptic anterior hypothalamic tissue, show that the central-nervous-system (CNS) temperature regulators residing in this brain region are extremely temperature sensitive. Two hypotheses attempting to explain the characteristics of the CNS temperature regulators of these two species are discussed. M.V.E.

A75-10232 **CNS regulation of body temperature during hibernation.** H. C. Heller and G. W. Colliver (Stanford University, Stanford, Calif.). *American Journal of Physiology,* vol. 227, Sept. 1974, p. 583-589. 19 refs. Grants No. NIH-5-R01-NS-10367-01; No. NIH-RR-07-005-06.

It is shown that the thermoregulatory responses during hybernation in golden-mantled ground squirrels are mediated by the central nervous system (CNS) body-temperature regulator located in the preoptic nuclei and hypothalamus (POH). By heating and cooling of the POH of hybernating ground squirrels, it was possible to elicit changes in metabolic heat production suggesting the possibility of proportional temperature regulation by POH. M.V.E.

A75-10233 Local effects of hypokalemia on coronary resistance and myocardial contractile force. R. A. Brace, D. K. Anderson, W.-T. Chen, J. B. Scott, and F. J. Haddy (Michigan State University, East Lansing, Mich.). *American Journal of Physiology*, vol. 227, Sept. 1974, p. 590-597. 40 refs. Research supported by the Michigan Heart Association and NIH.

A75-10234 * Correlation of hippocampal theta rhythm with changes in cutaneous temperature. J. M. Horowitz, M. A. Saleh, and R. D. Karem (California, University, Davis, Calif.). *American Journal of Physiology*, vol. 227, Sept. 1974, p. 635-642. 32 refs. Research supported by the University of California; Grants No. PHS-MH-06686; No. NGR-05-004-099; No. NGL-05-004-031.

Investigation of the possibility that the hippocampus performs the function of alerting an animal to changes in cutaneous temperature, using unanesthetized, loosely restrained rabbits. The results indicate that the hippocampal theta rhythm, which appears to be evoked by changes in cutaneous temperature, can be related to a specific type of hyppocampal neuron which is, in turn, connected with other areas of the brain involved in temperature regulation. M.V.E.

A75-10235 * Volume expansion and intrarenal blood flow of normal and salt-deprived rats. M. J. Kinney and V. A. DiScala (U.S. Public Health Service, Hospital, Staten Island, N.Y.). *American Journal of Physiology*, vol. 227, Sept. 1974, p. 652-656. 36 refs. Grant No. PHS-PY-72-70. NASA Order T-2950A.

A75-10236 * Xenon-133 washout for measuring intrarenal blood flow in the micropuncture rat. M. J. Kinney, J. Quinones, S. Rudich, and V. DiScala (U.S. Public Health Service, Hospital, Staten Island, N.Y.). *American Journal of Physiology*, vol. 227, Sept. 1974, p. 657-664. 27 refs. Grant No. PHS-PY-72-70. NASA Order T-2950A.

A75-10237 Physiological responses to hypoxia in the tundra vole. M. Rosenmann and P. Morrison (Alaska, University, Fairbanks, Alaska). *American Journal of Physiology*, vol. 227, Sept. 1974, p. 734-739. 35 refs. Grants No. NIH-GM-10402; No. NIH-RR-00518.

Investigation results are presented on the response of metabolism in the tundra vole, Microtus oeconomus, to low oxygen pressures, as measured at different metabolic loads induced by cold. Associated changes in respiration, heart rate, and body temperature are also reviewed. M.V.E.

A75-10238 Action of oxygen on the renal circulation. J. N. Norman, J. R. Shearer, A. J. Napper, I. M. Robertson, and G. Smith (Aberdeen, University, Aberdeen, Scotland). *American Journal of Physiology*, vol. 227, Sept. 1974, p. 740-744. 44 refs.

The results of an investigation of the action of oxygen on the renal circulation in dogs are shown to suggest that oxygen acts on the kidney merely as a nonspecific vasoconstrictor substance. Such a mechanism must be postulated to explain the various results obtained. This tends to disprove the suggestion of other investigators that oxygen reduces the renal blood flow by a toxic action on the renal tubules. M.V.E.

A75-10352 # An experimentally validated dynamic model of the spine. P. Prasad (Ford Motor Co., Dearborn, Mich.) and A. I. King (Wayne State University, Detroit, Mich.). *(American Society of Mechanical Engineers, U.S. National Congress of Applied Mechanics, 7th, University of Colorado, Boulder, Colo., June 3-7, 1974.) ASME, Transactions, Series E - Journal of Applied Mechanics*, vol. 41, Sept. 1974, p. 546-550. 25 refs. Contract No. N00014-69-A-0235-0001.

Although there has been a large number of mathematical models proposed for the simulation of spinal response to acceleration, few have been validated against experimental data and none appears to reflect the actual conditions of load transmission from one vertebra to the next. This paper provides a brief survey of existing spinal models and presents a discrete parameter model with experimental validation. The transmission of load via the articular facets is a major new feature of the model, based on previously obtained experimental data. Good correlation was obtained between the model results and experimentally measured spinal loads for different impact acceleration levels and spinal configurations. (Author)

A75-10411 Computer simulation of an electrochemical carbon dioxide concentrator system. C. H. Lin (Lockheed Electronics Co., Inc., Houston, Tex.) and J. Winnick (Missouri, University, Columbia, Mo.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 1. Montvale, N.J., AFIPS Press, 1974, p. 223-237. 12 refs.

Description of a steady-state two-part mathematical model developed for an electrochemical carbon dioxide concentrator system. Based on this model, computer simulations were successfully carried out for carbon dioxide, water, and heat transfer taking place in the concentrator system. The carbon dioxide model is capable of predicting quite accurately the transfer rate of CO2 for a wide range of operating conditions. It is also useful for the study of the performance of single electrochemical cells of such varying design parameters as matrix thickness, air and hydrogen flow rates. The successful development of this model demonstrates the feasibility of analytically simulating a complex multiphase electrochemical process based on fundamental transport equations. M.V.E.

A75-10418 Simulation of the dynamics of human locomotion. J. M. Parks and F. J. Kay (Houston, University, Houston, Tex.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 2. Montvale, N.J., AFIPS Press, 1974, p. 703-707. 10 refs.

An approach to human-gait simulation is described which represents an advancement in the available technology. A general, unified mathematical model is developed incorporating the important features of leg and body dynamics and the implementation of this model via a suitable computer program. A description is given of the derivation and important features of the model and of the computer program. Two areas appear attractive: control-mechanism design and optimization, and mass-distribution studies to improve (optimize) mass properties. F.R.L.

A75-10419 Experimentation and simulation - Valuable partners in the study of ventilatory control. H. T. Milhorn, Jr. (Mississippi, University, Jackson, Miss.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 2. Montvale, N.J., AFIPS Press, 1974, p. 715-719. 8 refs.

An attempt is made to investigate the overall control of ventilation by use of a combination of experimental and computer simulation studies. The following experiments were undertaken: (1) responses of tidal volume, respiratory frequency, minute ventilation, alveolar Pco2 and alveolar Po2 to sudden alterations of inspired CO2, (2) responses of the same variables to sudden changes in inspired O2, and (3) responses of the same variables to inspired O2 with and without alveolar Pco2 maintained constant. Besides adding new experimental information to the literature, these studies have also been useful in the development and verification of a model of the human respiratory control system for the simulation of acute acid-base balance disturbances. F.R.L.

A75-10420 Cardiovascular dynamics - Past, present and future models. H. J. Granger and G. E. Barnes (Mississippi, University, Jackson, Miss.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 2. Montvale, N.J., AFIPS Press, 1974, p. 732-734. 28 refs. Grant No. PHS-HL-11678.

An attempt is made to briefly review previous and current models of cardiovascular function, including analyses of cardiac function, of intrinsic and nervous regulation of the entire circulatory system, and to propose a multi-disciplinary approach to modeling of cardiovascular phenomena based on a thorough quantitative description of the cellular mechanisms underlying specific cardiovascular functions. Utilizing such an approach, the ultrastructural, biochemical, and biophysical data could be integrated into a model of the specific functional unit, i.e., the specific cell. An attempt is also made to identify those aspects of cardiovascular function currently amenable to this type of analysis, and to point out important missing links now existing in knowledge of other aspects of cardiovascular dynamics which cannot, at this time, be subjected to such an analysis. F.R.L.

A75-10421 Application of systems analysis to the study of motor control. J. F. Soechting, C. A. Terzuolo, and P. Viviani (Minnesota, University, Minneapolis, Minn.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 2. Montvale, N.J., AFIPS Press, 1974, p. 735-742. 43 refs. Grant No. PHS-NS-02567.

Discussion of some of the assumptions and restrictions which are implicit in the use of systems analysis to define the time-dependent characteristics of neural subsystems and the logic of their operations in the context of motor control. These include an analysis of the dynamic characteristics of the transformation between EMG and muscle tension, a study of the mechanical properties of muscle, and the formulation of a quantitative control model for the stretch reflex, including the dynamic characteristics of the pertinent receptor organs. Finally, selected results on the utilization of the reflex for specific tasks are presented. (Author)

A75-10422 * Human physiological problems in zero gravity - An attempt at understanding through systems analysis. R. J. White (Mississippi, University, Jackson, Miss.) and R. C. Croston (General Electric Co., Space Div., Houston, Tex.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 2. Montvale, N.J., AFIPS Press, 1974, p. 743-747. 18 refs. Contract No. NAS9-12932.

When the experimental situation is that of man exposed to a gravitationless environment for varying periods of time, the possible importance and value of a related modeling effort is readily apparent. One of the main objectives of the Skylab Program, with its missions of 28, 59, and 85 day duration concerned biomedical investigations of various types, and large amounts of relevant experimental data have been gathered and are in the process of being sorted and interpreted. In order to be of eventual usefulness in forming and testing consistent physiological hypotheses concerning the effect of zero gravity on man, a modeling effort was established in 1972 through the General Electric Company, Space Division, Houston, Texas. An account is given of some of the developments completed or in progress as part of this modeling effort. A long-term cardiovascular model and a large model of the systemic circulation are discussed. F.R.L.

A75-10423 Respiratory response to chemical and metabolic disturbances. A. Bidani and R. W. Flumerfelt (Houston, University, Houston, Tex.). In: Summer Computer Simulation Conference, Houston, Tex., July 9-11, 1974, Proceedings. Volume 2. Montvale, N.J., AFIPS Press, 1974, p. 748-754. 48 refs.

Immediate interest in the analysis and modeling of respiratory behavior is concerned with the extent to which compartmental chemosensitive representations can adequately duplicate some of the well known respiratory compensatory responses. In this connection, an advanced compartmental chemosensitive model of the respiratory system has been developed which includes the best features of previous models. In addition, significant changes in the intracompartmental representations for the gas exchange in the lungs, brain, and muscles have been made. The brain representation is particularly important because of its significant influence on respiratory behavior. Every attempt has been made to find the best available physiological data on which to estimate the model's transport and material parameters. F.R.L.

A75-10475 Sensory separation in climbing and mossy fiber inputs to cat vestibulocerebellum. J. I. Simpson, R. Llinas (Iowa, University, Oakdale, Iowa), and W. Precht (Max-Planck-Institut für Hirnforschung, Frankfurt am Main, West Germany). *Pflügers Archiv*, vol. 351, no. 3, 1974, p. 183-193. 25 refs. NSF Grant No. GB-3545; Grants No. PHS-NS-09916; No. PHS-NS-05748.

Double shock and flash stimulation of the optic chiasm of anesthetized cats evoked in the vestibulocerebellum field and unitary potentials characteristic of climbing fiber activation of Purkinje cells; electrical stimulation of the ipsilateral vestibular nerve evoked field potentials characteristic of a mossy fiber input in the vestibulocerebellum. Field potentials evoked by visual and vertibular stimulation frequently overlapped within the cerebellar cortex. These findings strongly suggest the possibility that the two afferent systems (optic chiasm and vestibular nerve) may be utilizing the cerebellar cortex in a 'time-sharing' mode, where the Purkinje cell is used as the main shared element to produce inhibition of specific cerebellar and vestibular nuclear cells. P.T.H.

A75-10701 Studies on arterial flow patterns - instantaneous velocity spectrums and their phasic changes - with directional ultrasonic Doppler technique. Y. Nimura, H. Matsuo, T. Hayashi, A. Kitabatake, S. Mochizuki, H. Sakakibara, K. Kato, and H. Abe (Osaka University, Hospital, Osaka, Japan). *British Heart Journal*, vol. 36, Sept. 1974, p. 899-907. 43 refs.

A75-10731 Assessment of pilotage error in airborne area navigation procedures. S. N. Roscoe (Illinois, University, Savoy, Ill.). *Human Factors*, vol. 16, June 1974, p. 223-228. 16 refs. USAF-FAA-sponsored research.

A general method establishing the workload demand and area navigation procedural blunders, vertical guidance, and other types of control systems is discussed. A study was conducted to establish pilotage error values for various classes of pilots and a new methodology was used that measured a pilot's residual attention in a standardized manner under specified flight situations. The experiments conducted revealed that a pilot's residual attention varied in an orderly and statistically reliable manner with each equipment characteristic. T.S.

A75-10732 Detecting slow changes in system dynamics. F. Ince and R. C. Williges (Illinois, University, Urbana, Ill.). *Human Factors*, vol. 16, June 1974, p. 278-285. 6 refs. Research supported by the Link Foundation; Contract No. F44620-70-C-0105.

Two laboratory experiments were performed to study the human operator's adaptive behavior in manual control of slowly changing system dynamics. In the first experiment, the dynamics changed from rate to acceleration control. In the second experiment, the control stick sensitivity slowly increased or slowly decreased from a standard level. Tracking performance on a compensatory task demonstrated that the human operator lags in adapting to the changing system dynamics, but he does adapt when given sufficient time. As the rate of change increases, the human operator needs a larger change for detection of the change and less time to detect the changing system dynamics. (Author)

A75-10733 An adaptive vigilance task with knowledge of results. E. L. Wiener (Miami, University, Coral Gables, Fla.). *Human Factors*, vol. 16, Aug. 1974, p. 333-338. 7 refs. Grant No. PHS-RO1-OH-00346.

Four groups of subjects performed a 48-min, computer-controlled, visual watch-keeping task. Two groups were run under

fixed, nonadaptive conditions, one with immediate knowledge of results (KR) and the other without (NKR). The KR group showed the usual superiority in detection rate over the NKR group, and made fewer commissive errors (false alarms). Two other groups, also KR and NKR, ran under adaptive conditions, wherein the size of the signals they watched for was adjusted during the vigil according to past performance, so as to maintain a preset detection rate. The resulting curves for the adaptive variable closely resembled the traditional performance measure, detection rate. Various adaptive strategies are discussed. (Author)

A75-10734 # **The detection of a simple visual signal as a function of time of watch.** W. H. Teichner (New Mexico State University, Las Cruces, N. Mex.). *Human Factors,* vol. 16, Aug. 1974, p. 339-353. 46 refs. Navy-supported research.

The percentage of detection of 37 studies of vigilance, using simple signals, was found to depend primarily on the initial or pretest detection level, the nature of the signal, i.e., whether it is a dynamic signal (requires movement or change of state of the eye) or static, and the duration of the watch. Using the data of these studies, a watchkeeping decremental function was developed. It was shown that the function can be used to estimate a tradeoff between time of watch and the initial percentage of detection. The loss of detection associated with static signals was found to be relatively small. It is suggested that it is this small loss which represents a vigilance process. The greater decrements associated with dynamic stimuli are assumed to be due to an additional ocular demand. (Author)

A75-10735 **Prediction of aural detectability of noise signals.** S. Fidell, K. S. Pearsons, and R. Bennett (Bolt Beranek and Newman, Inc., Canoga Park, Calif.). *Human Factors,* vol. 16, Aug. 1974, p. 373-383. 8 refs. Contract No. F33615-71-C-1220.

Two series of psychoacoustic tests were conducted to determine the applicability of the psychophysical theory of signal detectability (TSD) to prediction of the aural detectability of noise signatures in differing noise backgrounds. The first series of tests produced data supporting development of a simplified graphical prediction method based on TSD. A second series validated the precision and accuracy of the prediction method under quasi-realistic conditions. Predicted levels of performance were typically within one or two dB of the data. (Author)

A75-10736 * **The effect of spurious angular accelerations on tracking in dynamic simulation.** L. J. Beck (San Jose State University, San Jose, Calif.). *Human Factors,* vol. 16, Aug. 1974, p. 423-431. 21 refs. Grant No. NGL-05-046-002.

A laboratory study was conducted to investigate the effect of spurious simulator yaw motions on a pilot's control performance. A second objective was to compare the efficiency of static and dynamic simulator tracking in previously unexamined vehicle dynamics. Twelve airline pilots served as subjects in a moving-base flight simulator under congruent-motion, spurious-motion, and no-motion conditions. The results indicated a significant increase in the amount of error with increasing levels of spurious motion during the initially administered series of trials. The influence of spurious motion, however, was absent in a second series of trials. The data suggest that the pilots learned to compensate in their performance for the spurious inputs. It was also found that congruent visual and rotational cueing produced superior performance to that of tracking with visual information alone. (Author)

A75-10841 **A Fourier technique for simultaneous electrocardiographic surface mapping.** D. M. Monro (Imperial College of Science and Technology, London, England), R. A. L. Guardo, P. J. Bourdillon, and J. Tinker (Hammersmith Hospital; London, Royal Postgraduate Medical School, London, England). *Cardiovascular Research,* vol. 8, Sept. 1974, p. 688-700. 23 refs. Research supported by the National Research Council of Canada.

A method for the preparation of isopotential maps derived from thoracic surface electrocardiograms is described. Electrodes incorporating amplifiers are arranged in three rows of eight around the thorax, and are sampled simultaneously. The subsequent digital processing of the signals uses Fourier transforms to determine the potentials at the thoracic sites between the electrodes. The maps are automatically plotted at 2-msec intervals throughout the cardiac style. (Author)

A75-10965 **Handbook of perception. Volume 1 - Historical and philosophical roots of perception.** Edited by E. C. Carterette and M. P. Friedman (California, University, Los Angeles, Calif.). New York, Academic Press, Inc., 1974. 450 p. $23.50.

A collection of essays by philosophers and psychologists on the more theoretical aspects of perception and underlying sensory processes. Broad, non-quantitative issues are discussed in a historical and academic context. Contents are: sense experience, philosophical problems of perception, epistemology, questions on the philosophy of mind, problem of perceptual structure, association and the nativist-empiricist axis, consciousness in perception and action, attention, cognition and knowledge, organization and the Gestalt tradition, the learning tradition, paradigms for perception, the visual system and environmental information, ecological optics, information processing, automata, the developmental emphasis, phenomenology, and transactional and probabilistic functionalism. J.K.K.

A75-11057 **Risk of hearing damage caused by steady-state and impulsive noise.** W. Kraak, H. Ertel, G. Fuder, and L. Kracht (Dresden, Technische Universität, Dresden, East Germany). *Journal of Sound and Vibration,* vol. 36, Oct. 8, 1974, p. 347-359. 32 refs.

Temporary threshold shift (TTS) proves to be insufficient for characterizing the stress on hearing if, as hitherto employed, it is measured at a defined period after noise exposure. Actually, it is the time integral over TTS during and after exposure that gives a true measure of the stress on hearing. For almost every type of noise, there is a relation between physiological stress on hearing and the physical parameters of sound. Furthermore, there is a straightforward relation between loss of hearing after noise exposure of sufficient intensity and duration, on the one hand, and physiological stress, on the other hand. This relation may further be expanded to a correlation between loss of hearing and the physical parameters of sound. Hearing loss with increasing age (presbycusis) may therefore be handled as equivalent noise-induced stress. Some conclusions have been reached concerning audio dosimetry. (Author)

A75-11273 **Biosignal analysis. I - Properties of biosignals, objective of biosignal analysis (Biosignal-Analyse. I - Eigenschaften von Biosignalen, Ziel ihrer Analyse).** A. Habermehl (Marburg, Universität, Marburg an der Lahn, West Germany). *VDI-Z,* vol. 116, no. 14, Oct. 1974, p. 1131-1140. 15 refs. In German.

It is pointed out that every parameter which can physically unambiguously be determined as a function of time or spatial coordinates can be considered as a signal. Parameters derived from biological or physiological systems are called biosignals. A classification of biosignals according to physiological criteria is discussed along with continuous signals, discrete signals, the generation of biosignals by direct or indirect means, the temporal characteristics of biosignals, deterministic signals, and stochastic signals. Applications of biosignal analysis are related to fundamental research and clinical medicine. G.R.

A75-11303 **Control of tidal volume during rebreathing.** A. S. Rebuck, J. R. A. Rigg, M. Kangalee, and L. D. Pengelly (McMaster University, Hamilton, Ontario, Canada). *Journal of Applied Physiology,* vol. 37, Oct. 1974, p. 475-478. 17 refs. Research supported by the Medical Research Council of Canada and Joint Coal Board of New South Wales.

By analyzing the patterns of breathing in a group of subjects with widely differing ventilatory responses, an attempt was made to determine which of these factors is most responsible for the

differences seen. For example, by constraining a group of the subjects to use a single fixed tidal volume, the only variable left for the controller to change is respiratory frequency and, by selecting subjects with different 'natural' ventilatory responses, it might be possible to see whether these differences were due to differing frequency responses, or to a different 'choice' of available tidal volume. F.R.L.

A75-11304 Effect of posture on the ventilatory response to CO2. J. R. A. Rigg, A. S. Rebuck, and E. J. M. Campbell (McMaster University, Hamilton, Ontario, Canada). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 487-490. 24 refs. Research supported by the Canadian Thoracic Society.

The ventilatory response to CO2 in the sitting and supine positions was studied for two reasons, one basic and one clinical. The first was to ascertain if the mechanical and other physiological consequences of a change in posture affect the response. The second was to obtain base-line data for a study of ventilatory responsiveness following anesthesia and surgery. The findings support the hypothesis that no significant change in either tidal volume or total ventilatory response to CO2 occurs when subjects are studied in the lying and the sitting position. F.R.L.

A75-11305 Time course of man's ventilatory response to a sudden rise of PI sub O2. K. D. Lee (Queen Elizabeth Hospital, Birmingham, England). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 510-514. 22 refs. Research supported by the Royal College of Physicians of London and Royal College of Surgeons of England.

Eleven resting subjects (ages 22 to 57 yr) were made hypoxic and then given two breaths of oxygen. The fall in ventilation was analyzed breath by breath in terms of VE and VT to detect the point at which it began. The delay between the beginning of the first inspiration of oxygen and this point varied from subject to subject. The range was from about 4 to about 10 sec, and about 1 to about 4 respiratory cycles. There was a suggestion that the delay increased with the age of the subject. The implication is that the peaks of carotid chemoreceptor activity caused by respiratory variations in blood gas tensions would come at different phases of subsequent respiratory cycles in different subjects. If man possesses chemoreceptor mechanisms described in the cat, this could give important differences in the finer control of the ventilation in different subjects. F.R.L.

A75-11306 * Mechanisms of thermal acclimation to exercise and heat. E. R. Nadel, K. B. Pandolf, M. F. Roberts, and J. A. J. Stolwijk (Yale University, New Haven, Conn.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 515-520. 14 refs. Grants No. NIH-ES-00123; No. NIH-ES-00354; No. NGR-07-008-002.

By plotting local sweating rate from a given area against the central sweating drive (which is analogous to esophageal temperature, when mean skin temperature is constant), it is possible to determine the characteristic gain constant of that area as well as its point of zero central drive. An increase in the gain constant as a result of acclimation would indicate an increased sensitivity of the sweating mechanism per unit of central sweating drive, i.e., enhanced peripheral sensitivity. A displacement of the point of zero central drive as a result of acclimation would indicate that central mechanisms are responsible for the heightened sweating response. The study was undertaken to provide information about whether central or peripheral physiological mechanisms provide for increased sweating capabilities during acclimation, and about whether the increased sweating capabilities in heat acclimation and physical training are provided for by the same mechanisms. F.R.L.

A75-11307 Plasma volume changes following exercise and thermal dehydration. D. L. Costill and W. J. Fink (Ball State University, Muncie, Ind.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 521-525. 26 refs. Research supported by the American Heart Association, Northeast Indiana Chapter, Inc., Indiana Heart Association, and Ball State University.

This investigation was undertaken to compare the time course of changes in plasma volume following exercise and thermal dehydration. In addition, estimates were made of changes in red blood cell size following both methods of dehydration. In 1964 Kozlowski and Saltin reported a significant difference in body water distribution when men reduced body weight 4% either by exercise or thermally induced sweating. Recent studies have failed to support these findings and suggest that thermal and exercise dehydration do not differ in terms of the water and electrolyte concentrations in muscle and plasma. Studies are described which were conducted with six healthy men. F.R.L.

A75-11308 Estimation by a rebreathing method of pulmonary O2 diffusing capacity in man. P. Cerretelli, A. Veicsteinas, J. Teichmann, H. Magnussen, and J. Piiper (Milano, Università, Milan, Italy; Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 526-532. 18 refs. Research supported by the Bergbau-Berufsgenossenschaft.

The pulmonary O2 diffusing capacity (DO2) can be estimated in man from the kinetics of PO2 equilibration between lung gas and mixed venous blood during a rebreathing maneuver, when the following variables are known or can be simultaneously determined: mean rebreathing bag volume, mean lung volume, effective ventilation, pulmonary capillary blood flow, and slope of the blood O2 dissociation curve. Two rebreathing maneuvers, both performed after breathing 11.5 per cent O2 in N2 at steady state, are required. The validity and the applicability of the method are critically discussed. F.R.L.

A75-11309 Gas exchange in distributions of $\dot{V}$ sub A/$\dot{Q}$ ratios - Partial pressure-solubility diagram. J. B. West, P. D. Wagner, and C. M. W. Derks (California, University, La Jolla, Calif.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 533-540. 11 refs. Research supported by the Fonds de la Recherche Scientifique Médicale of Belgium; Grant No. NIH-HL-13687-03.

An approach to gas exchange in the presence of ventilation-perfusion inequality is given, based on a partial pressure-solubility diagram. This diagram shows the relationships between the alveolar and arterial pressures for various distributions of ventilation-perfusion ratios for gases with linear dissociation curves of all solubilities. It is useful for understanding how the alveolar-arterial difference for various gases develops and it clarifies the factors determining the impairment of gas transfer in the presence of ventilation-perfusion inequality. F.R.L.

A75-11310 Indicator mixing in the left heart and re-examination of mean circulation time. J. Boyle, III (New Jersey, College of Medicine and Dentistry, Newark, N.J.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 541-546. 24 refs. Research supported by the New Jersey Heart Association.

Indicator-dilution techniques have been used in dogs to measure the mixing characteristics of the left ventricle and aorta. The normal left ventricle consists of at least two compartments: (1) apex, and (2) midventricular outflow having different mixing or flow characteristics. Isoproteronol and vagal stimulation improved the mixing properties of the left ventricle. Aortic insufficiency in one animal was found to impair mixing within the ventricle and caused a prolongation of indicator washout from the outflow area. An alternative method is presented to replace the classical calculation of the mean circulation time. F.R.L.

A75-11311 * Analysis of effect of the solubility on gas exchange in nonhomogeneous lungs. W. E. Colburn, Jr., J. W. Evans, and J. B. West (California, University, La Jolla, Calif.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 547-551. 5 refs. NSF Grant No. GP-20836; Grants No. PHS-HL-13687-03; No. NGL-05-009-109.

A comparison is made of the gas exchange in nonhomogeneous lung models and in homogeneous lung models with the same total blood flow and ventilation. It is shown that the ratio of the rate of

gas transfer of the inhomogeneous lung model over the rate of gas transfer of the homogeneous lung model as a function of gas solubility always has the qualitative features for gases with linear dissociation curves. This ratio is 1 for a gas with zero solubility and decreases to a single minimum. It subsequently rises to approach 1 as the solubility tends to infinity. The early portion of the graph of this function is convex, then after a single inflection point it is concave. F.R.L.

A75-11312 Age and temperature regulation of humans in neutral and cold environments. J. A. Wagner, S. Robinson, and R. P. Marino (Indiana University, Bloomington, Ind.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 562-565. 20 refs. Grant No. PHS-R01-HD-04056-03.

The thermoregulatory mechanisms in the thermoneutral and cold environmental temperatures were significantly affected by age. In the thermoneutral environment (30 C) rectal temperatures and mean skin temperature decreased with advancing age due to lower metabolic rates, since lower levels of heat conductance also occurred with age. Younger subjects rapidly reacted to cold stress by increasing their metabolic rates and minimizing peripheral heat loss by rapid cutaneous vasoconstriction, whereas older men did not increase their metabolic rates to the same extent as younger subjects, and they were less able to maintain their body heat stores by cutaneous vasoconstriction. F.R.L.

A75-11313 Comparison of pulmonary blood volume in dogs by radiocardiography and dye dilution. J. H. Ellis, Jr. (Denver Veterans Administration Hospital, Denver, Colo.) and P. P. Steele (Colorado, University, Denver, Colo.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 570-574. 14 refs. Research supported by the American Lung Association of Colorado; U.S. Veterans Administration Grant No. 2338-02.

Review of the results of simultaneous quantitation of pulmonary transit time (PTT) and pulmonary blood volume (PBV) by dye-dilution analysis and by isotopic radiocardiography in 16 mongrel dogs with appropriately positioned catheters. The results suggest that the radiocardiographic technique used yields accurate and reproducible measurements of PTT and PBV. M.V.E.

A75-11314 Variability in cardiac output during exercise. J. R. McDonough (Washington, University, Seattle, Wash.) and R. A. Danielson (U.S. Public Health Service Hospital, Seattle, Wash.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 579-583. 26 refs. Grants No. PHS-HL-13517-03; No. PHS-OY-72-7-71.

Experimental data are presented on the variability of cardiac output and of related parameters during treadmill excercise up to maximal. Subjects included eight normal men, nine males with angina pectoris, and five males with healed myocardial infarction. The variability is quantified, and, where possible, sources are classified into categories of measurement error, intraindividual, and interindividual variability. M.V.E.

A75-11315 # Indirect measurement of systolic blood pressure during +Gz acceleration. F. J. Forlini, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 584-586. 12 refs.

Noninvasive determination of systolic blood pressure (Psa) during +Gz acceleration is inadequate due to biological vibrations secondary to skeletal muscle straining maneuvers. By use of a Doppler ultrasonic flow probe, occlusive arterial cuff with a cuff pressure transducer (sphygmomanometer) and a long arm cast for flow probe stability, no significant difference was found between this noninvasive system and direct arterial Psa up to +5 Gz. Employment of such a noninvasive system is accurate and atraumatic and reduces the need for qualified professional personnel to perform arterial catheterization. (Author)

A75-11316 Cannula-tip coronary blood flow transducer for use in closed-chest animals. F. D. Smith, L. G. D'Alecy, and E. O. Feigl (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 592-595. 7 refs.

A cannula-tip flow transducer has been designed which permits measurement of left circumflex coronary artery blood flow in anesthetized closed-chest animals. The transducer is inserted via the right common carotid artery, passed through the ascending aorta and coronary ostium, and wedged in the circumflex coronary artery. Blood flows from the aorta through the cannula into the coronary artery. Flow is measured using the ultrasonic Doppler shift technique. (Author)

A75-11317 On-line assessment of ventilatory response to carbon dioxide. J. S. Milledge, K. B. Minty, and D. Duncalf (Northwick Park Hospital, Harrow, Middx., England). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 596-599. 9 refs.

A new method is described in which the CO2 pressure/ventilation relationship during rebreathing is displayed continuously on an XY recorder. A gasmeter modified to produce an electrical signal proportional to gas flow is used to measure ventilation and an infrared analyzer to measure CO2 pressure. The output of these are connected to the X and Y inputs of the recorder. As modified the gas meter gave a linear response to both steady and intermittent flows. The time lag in its response did not alter the slope of the CO2 response line, except for the initial portion of the line, but did shift the position of the line to the right by 2-3 torr CO2 pressure. Results from trained and untrained subjects with this apparatus are presented and did not differ from those previously reported for normal subjects. Training did not improve the reproducibility of the results. (Author)

A75-11318 A method for the continuous measurement of oxygen consumption. C. T. Kappagoda, J. B. Stoker, and R. J. Linden (Leeds University; Killingbeck Hospital, Leeds, England). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 604-607. Research supported by the Medical Research Council, British Heart Foundation and Wellcome Trust.

A modification of an open-circuit flow-through technique for the measurement of oxygen consumption has been described. A stream of room air is drawn past the subject who respires freely from it. The difference in the concentration of oxygen in room air from which he inspires and in the mixture of room air and expired air which emerges from him is measured and expressed as a voltage. This voltage is amplified by a factor proportional to the rate of flow of room air thus yielding a continuous measurement of the oxygen consumption. This technique has no systematic error and has a clinically acceptable random error (95% tolerance limits of plus or minus 4%). (Author)

A75-11319 * Automated measurement of respiratory gas exchange by an inert gas dilution technique. C. F. Sawin, J. A. Rummel, and E. L. Michel (NASA, Johnson Space Center, Biomedical Research Div., Houston, Tex.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 608-611. 7 refs. Contract No. NAS9-12759.

A respiratory gas analyzer (RGA) has been developed wherein a mass spectrometer is the sole transducer required for measurement of respiratory gas exchange. The mass spectrometer maintains all signals in absolute phase relationships, precluding the need to synchronize flow and gas composition as required in other systems. The RGA system was evaluated by comparison with the Douglas bag technique. The RGA system established the feasibility of the inert gas dilution method for measuring breath-by-breath respiratory gas exchange. This breath-by-breath analytical capability permits detailed study of transient respiratory responses to excercise. F.R.L.

A75-11320 **A rate table for vestibular system testing.** R. L. Trimble, D. L. Clark, and H. R. Weed (Ohio State University, Columbus, Ohio). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 612-616. 6 refs. Research supported by the Ohio State University; Grant No. NIH-NS-09120-02.

An inexpensive rotary rate table control system is described for use in vestibular system stimulation with small animals. Design principles and construction details are included. Performance characteristics include constant angular velocity up to 600 deg/sec and angular acceleration profiles from 0.5 deg/sec/sec to 150 deg/sec/sec. The rate table is reversible and is designed to carry loads up to 12 kg. (Author)

A75-11321 **An ultrasonic pulsed Doppler system for measuring blood flow in small vessels.** C. J. Hartley (Rice University, Houston, Tex.) and J. S. Cole (Baylor University, Houston, Tex.). *Journal of Applied Physiology*, vol. 37, Oct. 1974, p. 626-629. 6 refs. Research supported by the American Heart Association; Grants No. NIH-HL-09251-08; No. NIH-HE-05435-13; No. NIH-HL-15706-01.

A75-11369 **Evaluation of frontal plane QRS loop rotation in vectorcardiographic diagnosis.** P. F. Poblete, P. M. Kini, C. D. Batchlor, and H. V. Pipberger (U.S. Veterans Administration Hospital; George Washington University, Washington, D.C.). *Journal of Electrocardiology*, vol. 7, Oct. 1974, p. 287-294. 28 refs. Grant No. NIH-HL-15047.

A75-11370 **A relation between the abnormal T loop and the exercise test.** K. Suzuki and S. Toyama (Center for Adult Diseases, Osaka, Japan). *Journal of Electrocardiology*, vol. 7, Oct. 1974, p. 347-354. 8 refs.

Cases with abnormal ST-T changes following the Master's double two step test (a positive exercise test) and cases with no significant changes following the exercise (negative exercise test) were collected, and the shapes of the T loop in these cases were compared. Abnormal T loops were found in most cases with a positive exercise test and in a few cases with a negative exercise test. Consequently, it was recognized that the abnormal T loop in cases with latent coronary insufficiency already appears at rest. It is stressed that observations of the testing T loop should be made to find coronary insufficiency. P.T.H.

A75-11380 **Functioning of the organism and space flight factors (Funktsiia organizma i faktory kosmicheskogo poleta).** Edited by N. N. Gurovskii. Moscow, Izdatel'stvo Meditsina, 1974. 232 p. In Russian.

The book consists of three parts. Part I, titled Space Physiology, deals with various aspects of the generation of artificial atmospheres in spacecrafts, and of sustaining human heat balance in space suits. Means of improving vestibular stability and of preserving the sense of orientation during space flights are examined. Part 2, titled Space Radiobiology, deals with protection against radiation during space flights. The biological effects of heavy ions are studied, and data of biochemical and immunological investigations are reviewed. Part III, titled Pharmacochemical Protection Against Ionizing Radiations, deals with experimental studies of the applicability of biological means of protection against ionizing radiation, capable of improving resistance to radiation and the general resistivity of the human organism, with particular reference to space flights. V.P.

A75-11418 **Some general principles for the study of the combined effect of space flight factors.** B. I. Davydov and V. V. Antipov. *(Kosmicheskie Issledovaniia*, vol. 12, Mar.-Apr. 1974, p. 285-298.) *Cosmic Research*, vol. 12, no. 2, Sept. 1974, p. 258-269. 48 refs. Translation.

A75-11500 **Quantitative determination of regional left ventricular wall dynamics by roentgen videometry.** J. G. Dumesnil, E. L. Ritman, R. L. Frye, G. T. Gau, B. D. Rutherford, and G. D. Davis (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Circulation*, vol. 50, Oct. 1974, p. 700-708. 22 refs. Grants No. NIH-HL-14196F; No. NIH-RR-7; No. NIH-HL-4664.

Roentgen videometry was used in order to evaluate regional left ventricular wall dynamics on the basis of the analysis of left ventricular angiograms from 32 patients undergoing coronary arteriography. Rate of wall thickening was the parameter measured rather than percentage increase in wall thickness. Severity of the abnormality of wall dynamics correlated well with the presence or absence of a previous infarction on the electrocardiogram. The data obtained provided an objective means of differentiating among three types of regional wall dynamics abnormalities: hypokinesia, akinesia, and dyskinesia. P.T.H.

A75-11509 * **Vacuum UV photolysis of N2O.** M. J. McEwan, G. M. Lawrence, and H. M. Poland (Colorado, University, Boulder; Colo.). *Journal of Chemical Physics*, vol. 61, Oct. 1, 1974, p. 2857-2859. 15 refs. Grant No. NGL-06-003-052.

Emission from N2 B (3 Pi g) and O(1 S) produced during vacuum UV irradiation of N2O was studied as a function of the wavelength of the incident radiation. Two different processes were responsible for producing N2(B 3 Pi g) close to its production threshold. One process formed B 3 Pi g molecules directly and one indirectly via an unidentified precursor having a lifetime about 27 microsec. The quantum yield of O(1 S) atoms produced by photodissociation of N2O was determined as a function of incident photon energy. This yield is near 100% at 129 nm. (Author)

A75-11534 * **The metabolism of carbohydrates by extremely halophilic bacteria - Glucose metabolism via a modified Entner-Doudoroff pathway.** G. A. Tomlinson, T. K. Koch (Santa Clara, University, Santa Clara, Calif.), and L. I. Hochstein (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Canadian Journal of Microbiology*, vol. 20, no. 8, 1974, p. 1085-1091. 17 refs. NASA-supported research.

A75-11573 # **Mechanisms of muscular activity control: Normal and pathological states (Mekhanizmy upravleniia myshechnoi aktivnost'iu: Norma i patologiia).** M. A. Aizerman, E. A. Andreeva, E. I. Kandel', and L. A. Tenenbaum (Institut Problem Upravleniia, Moscow, USSR). Moscow, Izdatel'stvo Nauka, 1974. 167 p. 65 refs. In Russian.

Description and evaluation of experiments investigating the control mechanisms for voluntary and involuntary movements of man in the normal and pathological state. The experimental data fall under three groups. The first group is related to the maintenance of muscular tension in the joint muscles and, consequently, of the joint angle in the absence of isometry. The second group concerns organizations of the simplest movements, while the third group relates to motor destructions in subjects afflicted with parkinsonism. Various hypotheses are advanced on control mechanisms. P.T.H.

A75-11793 # **The biological clock.** J. E. Harker (Cambridge University; Girton College, Cambridge, England). *Science Progress*, vol. 61, Summer 1974, p. 175-189. 28 refs.

Rhythmical patterns in behavior, in many physiological processes, and in the varying concentrations of many metabolic substances have been observed in practically every animal and plant. Many of these rhythms occur as a direct, or indirect, result of changes in the environment of the organism, but others are maintained even when the animal or plant is kept in a completely constant environment. Although there is some debate about whether it is possible to eliminate all rhythmic environmental variables, as is discussed, the continuation of the rhythm of a biological process under conditions of constant temperature and continuous light or darkness, suggests that the rhythm is generated within the organism

itself. The source of such rhythms is generally described as being a 'biological clock'. The control of the timing of rhythms with a wide variety of periods, ranging from tidal to annual, have all been ascribed to biological clocks, but it is those rhythms with a period of close to 24 hr, known as circadian rhythms, which have been by far the most extensively studied, and it is only the control of such rhythms which is discussed. F.R.L.

A75-11805 # Acute toxicity in rats and mice exposed to hydrogen chloride gas and aerosols. K. I. Darmer, Jr., E. R. Kinkead, and L. C. DiPasquale (California, University, Irvine, Calif.). *American Industrial Hygiene Association Journal*, vol. 35, Oct. 1974, p. 623-631. 8 refs. Contract No. F33615-73-C-4059. AF Project 6302; AF Task 01.

Hydrogen chloride (HCl) is one of the combustion products formed during the test firing of certain rocket and missile engines. A study was undertaken to determine the LC sub 50 values for rats and mice exposed to various measured concentrations of either HCl gas or HCl aerosol for 5 and 30 minutes. This accomplished two objectives; first, to define short-exposure toxicity levels for HCl in either form, and, second, to determine whether the aerosol form represented a greater hazard than the gas itself. The respiratory tract was the primary target for HCl in either form and lesions were similar to those produced by other severe pulmonary irritants. The results indicate that HCl gas and HCl aerosol have comparable toxicity in rats and mice. Comparison of these results with another study of HCl gas toxicity in rabbits and guinea pigs showed that HCl gas had the same degree of toxicity in mice, rabbits, and guinea pigs, while rats were considerably more tolerant. (Author)

A75-11806 Sensory irritation evoked by plastic decomposition products. Y. Alarie, C. K. Lin, and D. L. Geary (Pittsburgh, University, Pittsburgh, Pa.). *American Industrial Hygiene Association Journal*, vol. 35, Oct. 1974, p. 654-661. 27 refs.

The paper evaluates sensory irritation of the upper respiratory tract due to the action of combustion products of polystyrene and polycarbonate. The characteristic decreases in mouse respiration rates monitored during and after exposure to the combustion products were used as an index of sensory irritation of the upper respiratory tract. The combustion products of the plastics investigated induced sensory irritation rapidly. Recovery occurred soon after the termination of exposure. The dose-response relationship obtained with all three materials showed that the combustion products of polystyrene films were the most irritating followed by styrofoam and polycarbonate. The addition of diphenylchloroarsine to polystyrene produced a much longer recovery time. T.S.

A75-11834 Inter-saccadic interval analysis of optokinetic nystagmus. M. Cheng and J. S. Outerbridge (Royal Victoria Hospital, Montreal, Canada). *Vision Research*, vol. 14, Nov. 1974, p. 1053-1058. 17 refs. Medical Research Council of Canada Grant No. MA-3794.

Optokinetic nystagmus from healthy human subjects was recorded at different intensity levels elicited by different speeds of the optokinetic stimulus. The time intervals between the onset of consecutive fast components were analyzed and a characteristic pattern of variation in the interval histogram was observed. As the intensity of nystagmus decreased, the interval histogram changed from being symmetric mono-modal, to asymmetric mono-modal and finally to a multi-modal form in which the high order modes were approximately integral multiples of the basic mode. This characteristic change was distinctly altered when the subject followed the optokinetic stimulus voluntarily. The findings lead to new hypotheses about the nystagmus mechanism. (Author)

A75-11835 Perceptual integration and perceptual segregation of brief visual stimuli. J. H. Hogben and V. di Lollo (Western Australia, University, Nedlands, Australia). *Vision Research*, vol. 14, Nov. 1974, p. 1059-1069. 13 refs. Australian Research Grants Committee Grant No. 17-226.

Six experiments are reviewed that investigate the perception of a visual pattern whose components are presented successfully over brief intervals in time. Twenty-four out of twenty-five dots forming a five-by-five matrix are presented in random order, over some interval of time, and the location of the missing dot is identified. The findings illustrate two classes of effects that reflect the manner in which the visual system handles incoming information. The first class is typified by the continued perceptual availability of brief stimuli. The second class is typified by the perceptual segregation of portions of the display. Results indicate that the effect of the duration of a temporal gap is related to the duration of the preceding, and, possibly, following stimuli. T.S.

A75-11836 Binocular summation and suppression - Visually evoked cortical responses to dichoptically presented patterns of different spatial frequencies. M. R. Harter, W. H. Seiple, and M. Musso (North Carolina, University, Greensboro, N.C.). *Vision Research*, vol. 14, Nov. 1974, p. 1169-1180. 58 refs. Research supported by the University of North Carolina; NSF Grant No. GB-8053.

A75-11837 Singly and doubly contingent after-effects involving color, orientation and spatial frequency. H. J. Wyatt (Washington University, St. Louis, Mo.). *Vision Research*, vol. 14, Nov. 1974, p. 1185-1193. 19 refs. Grants No. PHS-NS-05644; No. PHS-EY-00053.

A75-11838 Short-term memory in stereopsis. J. Ross and J. H. Hogben (Western Australia, University, Nedlands, Australia). *Vision Research*, vol. 14, Nov. 1974, p. 1195-1201. 14 refs. Australian Research Grants Committee Grant No. A68/16810.

A new stochastic dot stereogram method for producing depth scenes from random point trains to each separate eye is used to measure the time for which information is held to enable stereopsis. The results indicate that one signal train may lag behind the other by 36-72 msec without affecting clear perception of form in depth. They suggest the existence of a visual memory system for stereopsis holding input to one eye for up to 50-70 msec but losing information about the input rapidly thereafter. The suggestion is confirmed by results with other less novel methods. (Author)

A75-11839 A technique for recording the electroretinogram /ERG/ from chronically implanted electrodes in animals. R. P. Borda (Methodist Hospital, Houston, Tex.) and J. J. Hablitz (Baylor College of Medicine, Houston, Tex.). *Vision Research*, vol. 14, Nov. 1974, p. 1219-1221. 5 refs. Contract No. F41609-72-C-0032; Grant No. NIH-HL-05435.

A75-11840 Motion aftereffect magnitude as a measure of the spatio-temporal response properties of direction-sensitive analyzers. A. Pantle (Miami University, Oxford, Ohio). *Vision Research*, vol. 14, Nov. 1974, p. 1229-1236. 14 refs.

After an observer views an adapting pattern moving uniformly in one direction for a prolonged period of time, a stationary pattern will appear to move in the opposite direction. In the present experiments observers inspected spatially periodic, adapting patterns which were moved at different speeds in different experimental conditions. The magnitude of the motion aftereffect which was generated in each condition was measured. There was an interaction between pattern characteristics and adapting speed. For a variety of patterns the temporal frequency, rather than the velocity, of the adapting patterns was the critical determinant of aftereffect magnitude. The psychophysical results suggest (1) that the responses of direction-sensitive analyzers in humans are controlled by the temporal frequency of drifting patterns rather than their velocity, and (2) that the peak response frequency of direction-sensitive analyzers is about 5 Hz under low photopic levels of illumination. (Author)

A75-11841 **Are visual evoked potentials to motion-reversal produced by direction-sensitive brain mechanisms.** P. G. H. Clarke (Oxford University, Oxford, England). *Vision Research*, vol. 14, Nov. 1974, p. 1281-1284. 15 refs. Research supported by the Science Research Council.

'Direction-sensitive' implies that the response to a particular direction of motion is not identical to the response when the motion is in the opposite direction. Questions of direction-dependent adaptation to motion are considered and the possibility of interference from direction-insensitive mechanisms is investigated. It is found that the motion-reversal visual evoked potentials are produced largely by direction-sensitive mechanisms within the brain. G.R.

A75-11866 **Human engineering in process automation.** C. Benz (Siemens AG, Nürnberg, West Germany). *Siemens Forschungs- und Entwicklungsberichte*, vol. 3, no. 5, 1974, p. 310-316. 8 refs.

The application of human engineering to process automation is discussed. Human engineering rules have been applied to programming the Keyboard S3 and the control panel instruments for the TELEPERM-TELEPNEU 300 process control system. The economical television raster methods present both alphanumeric characters and other symbols in black and white or in color. The problem of conveying symbolic information to man is discussed. A flow diagram of part of one of the generating blocks of a power station as presented on a Siemens Graphic CRT is included. Observation shows that the operation of personnel in the control room must be understood to achieve good human engineering solutions. The work studies carried out in control rooms provide data on reading distance, reading accuracy, setting accuracy, and setting speed. T.S.

A75-12018 # **Human electrocortical reactions to light as a function of age (Elektrokortikal'ni reaktsii na svitlo pri starinni liudini).** M. B. Man'kovs'kii and R. P. Bilonog (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, Sept.-Oct. 1974, p. 654-661. 32 refs. In Ukrainian.

EEG studies of 400 healthy people ranging in age from 20 to 105, using single and rhythmic photostimulation, show that, with growing age, the latent period and the duration of afferent-stimulation following aftereffects tend to increase. By contrast, response intensities and the range of reproduced rhythms diminish with growing age. M.V.E.

A75-12158 **Light-evoked release of glycine from the retina.** B. Ehinger and B. Lindberg (Lund, Universitet, Lund, Sweden). *Nature*, vol. 251, Oct. 25, 1974, p. 727, 728. 17 refs. Research supported by the Statens Medicinska Forskningsrad and Lunds Universitet.

A demonstration was carried out of light-induced release of radioactivity from retinae preloaded with radioactive glycine. The site of uptake of radioactivity into the retinae was checked by autoradiography. An active high affinity uptake system into a type of amacrine cells was shown. Thirty three experiments were performed on rabbit retinae. Before stimulation; the radioactivity of the superfusates decreased. During light stimulation the radioactivity increased by a factor of 1.30. Due to technical reasons, the experiments on anaesthetised cats were variable. Results in both in vivo and in vitro experiments show that light stimulation can release radioactivity from retinae preloaded with H-glycine. The demonstration supports evidence that glycine is a neurotransmitter, but it does not show to what extent the released radioactivity might represent serine. T.S.

A75-12159 **Does the central human retina stretch during accommodation.** M. Hollins (North Carolina, University, Chapel Hill, N.C.). *Nature*, vol. 251, Oct. 25, 1974, p. 729, 730. 5 refs. Research supported by the University of North Carolina and NIH.

Experiments were conducted to show that the central region of the human retina stretches some 4.5% during marked accommodation. Measurements were made at seven different levels of accommodation to plot the distance in the visual angle between the fixation cross and the test line. The data imply that the fovea and the optic disk are more widely separated when accommodation is strained than when it is relaxed. Implications for the study of accommodation micropsia and other perceptual phenomena are indicated. T.S.

A75-12247 # **Man as a precious resource - The enhancement of human effectiveness in flight operations.** S. N. Roscoe (Illinois, University, Urbana, Ill.). *AIAA, DOT, and NASA, Life Sciences and Systems Conference, Arlington, Tex., Nov. 6-8, 1974, AIAA Paper 74-1296.* 10 p. 46 refs. USAF-Navy-FAA-supported research.

Questions of behavioral engineering are considered, giving attention to function allocation and display and control design. Details of pilot training and testing are examined, taking into account synthetic flight training, training cost effectiveness, the state of the simulation art, and the fidelity of training devices. Innovations in flight training are related to automatically adaptive training, computer-assisted instruction, and adaptive measurement of residual attention. Skill in the rapid time-sharing of attention among various competing demands is an important quality of the effective aircraft commander. G.R.

A75-12341 # **Decompression disorders (Dekompressionnye rasstroistva).** P. M. Gramenitskii. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 25), 1974. 350 p. 307 refs. In Russian.

The present work discusses the results of a systematic study of functional disorders arising in an organism during decompression as a result of the formation of gaseous vesicles in the blood and tissues. Numerous experiments are analyzed in which the characteristics of the development of decompression disorders in test animals following extended periods at high pressure were investigated. The role of air embolism in the development of decompression disorders is discussed, and the presence of defense reactions against air embolism and the possibility of increasing an organism's stability towards decompression effects are investigated. Rules for the prevention of decompression disorders in astronauts during exit from the spacecraft into free space are established. P.T.H.

A75-12414 # **An estimate for the activities of a human operator (Ob odnoi otsenke deiatel'nosti cheloveka-operatora).** G. G. Man'shin, A. I. Alifanov, and V. A. Mishchenko (Akademiia Nauk Belorusskoi SSR, Institut Problem Nadezhnosti i Dolgovechnosti Mashin, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady*, vol. 18, Sept. 1974, p. 797-800. In Russian.

A model in which the efficiency of a machine is characterized by the components of a certain parameter vector is used to formulate the following problem: assume that at a moment of time, the state of the system was checked, and the results were used by the operator to control the system's performance. At some later moment of time, a sequential test of the machine/operator interaction was carried out. On the basis of this test, it is required to evaluate the operators functions in controlling the system's performance within any given frame of reference. A solution is obtained in which allowance is made for possible operator errors and for the random variation of the controllable parameters during the time between the tests. V.P.

A75-12503 # **Heart adaptation to physical exertion in relation to work duration.** P. Korge, S. Roosson, and M. Oks (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Acta Cardiologica*, vol. 29, no. 4, 1974, p. 303-320. 40 refs.

Ninety-five rats were used to study the effect of swimming exercises of various duration on (1) myocardial water and electrolyte changes, (2) myocardial Na, K-ATPase activity, (3) adrenocortical activity, and (4) the arterial blood acid-base balance state. A histological investigation of the myocardium was carried out to evaluate the severity of the exertions. The results showed that the

effect of physical exertion on the above mentioned factors was dependent on the duration of exercise. Moderate work was characterized by (1) increased K in the myocardial cells, without significant increases in water and Na levels, and (2) an increase in Na, K-ATPase in adrenocortical activity, accompanied by metabolic acidosis. Extreme exertion caused extensive intracellular edema and Na accumulation with a decrease in Na, K-ATPase activity with metabolic alkalosis. The possible relationship between these indicators of metabolic and endocrine activity is discussed. T.S.

A75-12520 Correlation of left ventricular mass determined by echocardiography with vectorcardiographic and electrocardiographic voltage measurements. D. H. Bennett and D. W. Evans (Papworth Hospital, Cambridge, England). *British Heart Journal*, vol. 36, Oct. 1974, p. 981-987. 20 refs.

A75-12521 Noninvasive study of effect of isometric exercise on left ventricular performance in normal man. M. A. Stefadouros, W. Grossman, M. El Shahawy, F. Stefadouros, and A. C Witham (Georgia, Medical College, Augusta, Ga.; North Carolina University, Chapel Hill, N.C.). *British Heart Journal*, vol. 36, Oct 1974, p. 988-995. 44 refs.

A75-12613 Electrocardiographic responses to atrial pacing and multistage treadmill exercise testing - Correlation with coronary arteriography. J. C. Rios and L. E. Hurwitz (George Washington University, Washington, D.C.). *American Journal of Cardiology*, vol. 34, Nov. 1974, p. 661-666. 17 refs.

A75-12614 Psychological stress and ventricular arrhythmias during myocardial infarction in the conscious dog. R. Corbalan, R. Verrier, and B. Lown (Harvard University, Boston, Mass.). *American Journal of Cardiology*, vol. 34, Nov. 1974, p. 692-696. 23 refs. Grants No. NIH-MH-21384; No. NIH-HL-14602.

The influence of psychological stress on cardiac rhythm was studied in eight conscious dogs before and after coronary arterial occlusion. The behavioral and cardiac responses of the animals were compared in stressful and nonstressful environments. Before coronary arterial obstruction, psychological stress lowered the vulnerable period threshold for repetitive ventricular responses by 82 percent. After myocardial infarction, presentation of stressful stimuli provoked diverse ventricular arrhythmias including ventricular tachycardia and early extrasystoles with T wave interruption. Our study provides an experimental model for the systematic investigation of the role of psychological factors in the development of cardiac arrhythmias. (Author)

A75-12696 Accommodative response to blur. L. M. Smithline (Cornell University, Ithaca, N.Y.). *Optical Society of America, Journal*, vol. 64, Nov. 1974, p. 1512-1516. 13 refs. Grant No. NIH-RR-0326.

By use of a blur-pseudostimulus technique and high-speed infrared optometric measurements, the singularity of blur as a stimulus to human accommodation was studied. Blur is not the sole stimulus; it is a necessary cue, but not a sufficient one. The accommodative system makes use of one or more available odd-error (error sign) cues, which are believed to supplement blur with requisite focusing information. (Author)

A75-12697 Visibility of unpredictably flickering lights. J. J. Koenderink and A. J. van Doorn (Groningen, Rijksuniversiteit, Haren, Netherlands). *Optical Society of America, Journal*, vol. 64, Nov. 1974, p. 1517-1522. 11 refs.

The sensitivity of the visual system to temporal modulation with unpredictable, aperiodic signals was measured. Three kinds of stimulation were used, (1) a band-limited Gaussian random signal, (2) a passband-limited Gaussian random signal, and (3) a periodically quenched random signal. The sensitivity to stimulation with random signals can be predicted from the sensitivity of the visual system to periodic temporal signals. The sensitivity to random signals with narrow frequency bands at high frequencies is governed by the pseudoflash phenomenon. If the bandwidth is such that the signal contains less than two independent samples per second, the psychometric curve follows from the amplitude distribution of the random signal. If the signal contains a larger number of independent samples per second, the psychometric curves are as steep as they are for sine-wave stimulation. If the De Lange characteristic is the envelope of the sensitivity characteristics of independent channels, sensitive to specific frequency bands, then these experiments make it possible to estimate the bandwidth of the most-sensitive channel. F.R.L.

A75-12698 Effects of the cone-cell distribution on pattern-detection experiments. D. H. Kelly (Stanford Research Institute, Menlo Park, Calif.). *Optical Society of America, Journal*, vol. 64, Nov. 1974, p. 1523-1525. 13 refs. NSF Grant No. GB-33322; Grant No. NIH-EY-01128.

At photopic luminance levels, the cone-cell variation of packing density across the retina provides a natural limit to the effective size of wide-field stimulus patterns. In some experiments, this eliminates the need for small test spots, which produce band-broadening effects in the spatial-frequency domain. Calculations of these effects are given, to aid in the design of such experiments. (Author)

A75-12721 Spacelab life science technology studied. E. J. Bulban. *Aviation Week and Space Technology*, vol. 101, Nov. 11, 1974, p. 50, 51, 53.

A mockup approximating the internal dimensions of the Spacelab science payload to be carried by the space shuttle is being used at Johnson Space Center as a technical and management tool to carry out prime objectives. These are to serve as a definition and concept development mechanism for the JSC life sciences payloads program; to develop and evaluate a center-wide management and support approach for the program; to evaluate current Spacelab configuration and operational concepts from the user's standpoint; and to develop concepts and requirements for establishing the test facility for flight configuration payloads. F.R.L.

A75-12801 * Salt-dependent properties of proteins from extremely halophilic bacteria. J. K. Lanyi (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.). *Bacteriological Reviews*, vol. 38, Sept. 1974, p. 272-290. 126 refs.

Based on information concerning the interaction of salts and macromolecules the literature of the enzymes of halophilic bacteria and their constituents is examined. Although in halophilic systems the salt requirement of enzyme activity is variable the enzymes investigated show a time-dependent inactivation at lower salt concentrations especially in the absence of salt. The studies described show that in some halophilic systems the effect of salt may be restricted to a small region on the protein molecule. The concept of the hydrophobic bond to consider certain solvent-dependent phenomena is introduced. It is shown that some halophilic enzymes are unable to maintain their structure without the involvement of hydrophobic interactions that are usually not supported by water. A table lists indices of hydrophobicity and polarity for various halophilic and nonhalophilic proteins. T.S.

A75-12816 * The dynamic response of visual accommodation over a seven-day period. R. J. Randle and M. R. Murphy (NASA, Ames Research Center, Moffett Field, Calif.). *American Journal of Optometry and Physiological Optics*, vol. 51, Aug. 1974, p. 530-544. 10 refs.

Four college students, ranging in age from 18 to 21 years, were tested on their dynamic, monocular accommodation responses to a square wave stimulus and sine waves of two frequencies. The tests

were conducted over a period of seven days in a controlled environment, each subject being tested once every three hours. Latency, magnitude, velocity, gain and phase lag of the responses were measured, and means and standard deviations were computed. The latency of response was stable throughout and agreed fairly well with previous studies. The response magnitude was relatively stable. Three of the subjects had higher velocities on receding targets; one was faster on approaching targets. The group mean velocity increased over the seven days of the study. In keeping with the trend to faster dynamics over the seven days, botn gain and phase lag improved. (Author)

A75-12823 * **Brain stem auditory evoked responses in human infants and adults.** K. Hecox and R. Galambos (California, University, La Jolla, Calif.). *Archives of Otolaryngology*, vol. 99, Jan. 1974, p. 30-33. 17 refs. Research supported by the Sloan Foundation; Grants No. PHS-NS-10482-01; No. NGR-05-009-198.

Brain stem evoked potentials were recorded by conventional scalp electrodes in infants (3 weeks to 3 years of age) and adults. The latency of one of the major response components (wave V) is shown to be a function both of click intensity and the age of the subject; this latency at a given signal strength shortens postnatally to reach the adult value (about 6 msec) by 12 to 18 months of age. The demonstrated reliability and limited variability of these brain stem electrophysiological responses provide the basis for an optimistic estimate of their usefulness as an objective method for assessing hearing in infants and adults. (Author)

A75-12859 **Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973.** Meeting sponsored by COSPAR and Deutsche Forschungsgemeinschaft. Edited by P. H. A. Sneath. Berlin, East Germany, Akademie-Verlag GmbH, 1974. 244 p. In English and French. $29.25.

Subjects related to radiation biology are considered, giving attention to chemical protection against radiation-induced genetic damage during the period of after-effects of gravity stress, retinal change induced in the primate by oxygen nuclei radiation, the charge spectrum of heavy cosmic ray nuclei measured in the Biostack experiment aboard Apollo 16, and the action of cosmic heavy ions on the development of eggs. The detection of extraterrestrial life by radiometric techniques is discussed along with topics in the area of planetary quarantine. Questions of gravitational biology are also explored, taking into account haemodynamic changes caused in rats by prolonged accelerations, the effect of dynamic factors of space flights on the green alga Chlorella vulgaris, and metabolic responses of monkeys to increased gravitational fields. G.R.

A75-12860 # **Detection of extraterrestrial life by radiometric techniques.** A. A. Imshenetskii and B. G. Murzakov (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 3-11.

The evolution of radioactive CO2 from C-14 labelled substrates by desert soils has been studied. Formate, acetate, lactate, glycine and protein hydrolysate are attached much more rapidly than glucose in the first few hours of incubation. Glucose utilization increases considerably after 12 hours incubation. The rate of CO2-14 evolution is much reduced by low humidity. The optimal temperature is 28 to 37 deg, and addition of yeast autolysate and liver extract increases CO2-14 evolution. F.R.L.

A75-12861 # **The Biostack experiments I and II aboard Apollo 16 and 17.** H. Bücker (Frankfurt, Universität, Frankfurt am Main, West Germany). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 43-50. 9 refs.

The objectives of this experiment are to study the biological effects of individual heavy cosmic particles of high-energy loss (HZE) not available on earth; to study the influence of additional space flight factors; to get some knowledge on the mechanism by which HZE particles damage biological materials; to get information on the spectrum of charge and energy of the cosmic ions in the spacecraft; and to estimate the radiation hazards for man in space. For this purpose the Biostack experiment comprises a widespread spectrum of biological objects, and various radiobiological end-points are under investigation. By using special arrangements of biological objects and physical track detectors, individual evaluation of tracks was obtained allowing the identification of each penetrating particle in relation to the possible biological effects on its path. F.R.L.

A75-12862 # **Microbial studies in the Biostack experiment of the Apollo 16 mission - Germination and outgrowth of single Bacillus subtilis spores hit by cosmic HZE particles.** G. Horneck, R. Facius (Frankfurt, Universität, Frankfurt am Main, West Germany), W. Enge, R. Beaujean, and K.-P. Bartholomä (Kiel, Neue Universität, Kiel, West Germany). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 75-83. 12 refs.

A75-12863 # **Study of cosmic ray effects on Artemia salina eggs during the Apollo 16 and 17 flights.** H. Planel, J. P. Soleilhavoup, Y. Blanquet (Toulouse, Université, Toulouse, France), and R. Kaiser (Commissariat à l'Energie Atomique, Centre d'Etudes Nucléaires de Strasbourg, Strasbourg, France). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 85-89.

A75-12864 # **Effect of hypergravity and hyperthermia on antidiuretic hormone secretion.** P. Groza, S. Cananau, E. Daneliuc, and A. Bordeianu (Institute of Normal and Pathological Physiology, Bucarest, Rumania). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 107-112. 19 refs.

The effect of acceleration and hyperthermia on the antidiuretic hormone secretion (ADH) was investigated in rats both separately and simultaneously. The two conditions of stress elicited a rise in plasma ADH concentration in proportion to their intensity. Concomitant exposure to the two factors produced an additional effect. The parallel histochemical studies using methods for demonstrating RNA, proteins and the neurosecretory material in the supraoptic nucleus, showed the synthesis and depletion of the hormone content in correlation with the plasma concentration of ADH. (Author)

A75-12865 # **Digestive and resorptive function of the small intestine in stressful situation.** K. V. Smirnov and A. M. Ugolev. In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 119-123. 13 refs.

The study examines the effect of severe stress on digestive and resorptive functions of the small intestine. Transverse 20-min acceleration (+10 G sub x) results in an increase of invertase activity, particularly in distal parts of the small intestine. Although the activity of glycyl-l-leucine dipeptidase was changed, the fluctuations were less pronounced than those on invertase activity. Acceleration also produces rise in glucose accumulated in the intestinal mucosa and intensification of active carbohydrate transport. The displacement of the proximodistal gradient of invertase activity and carbohydrate resorption was significant. Following exposure to unusual gaseous atmospheres (hypoxic, hypercapnic, and hyperoxic) there was an increase in active glucose transport over the entire length of the small intestine. F.R.L.

A75-12866 # **Respiratory gas exchange as an indicator of changed radioresistance in mammals.** L. Novak and J. Misustova (Ceskoslovenska Akademie Ved, Biofyzikalni Ustav, Brno, Czechoslovakia). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 125-128. 14 refs.

Attention is given to the problem of detection of radioprotective effects during irradiation. The method used is based on the fact that the known effective pharmacological and chemical radioprotectives interfere directly or indirectly with enzymatic steps in energy metabolism of the organism. In mammals they induce at the same time an increase of resistance against ionizing radiation and a decrease in the respiratory gas exchange expressed by a depressed oxygen consumption. The study is of practical importance since it makes it possible to evaluate quantitatively the effect of radioprotective measures (including the hypoxia) in individual experimental animals during the course of irradiation. F.R.L.

A75-12867 # **Modifications of pulmonary perfusion and ventilation during simulated weightlessness (Modifications de la perfusion et de la ventilation pulmonaires au cours de l'impesanteur simulée).** P. Calen, R. Grandpierre, and A. Lasnier (Bordeaux, Université, Floirac, Gironde, France). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973.
Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 147, 148. In French.

A75-12868 # **The role of gravity in the phylogeny of structure and function in animal sensors of spatial orientation, and their predicted action in weightlessness.** Ia. A. Vinnikov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 159-176. 28 refs.

A75-12869 # **The stabilizing effect on the trunk of labyrinth and neck reflexes acting together on the limbs.** T. D. M. Roberts (Glasgow, University, Glasgow, Scotland). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973.
Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 181, 182. 5 refs.

A75-12870 # **Verification of the efficacy of spacecraft sterilization.** V. I. Vashkov, N. V. Ramkova, G. V. Scheglova, L. Z. Skala, and A. G. Nekhorosheva. In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973. Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 199-202. 10 refs.

The possibility that terrestrial microorganisms can survive decontamination and be ejected into the environment of planets emphasizes the need for control of sterilization, and the development of standards based on models made of relevant materials, which can be carefully investigated. Control of sterilization can be by physical, chemical, or biological (bacteriological) means, depending on the purpose; bacteriological methods are the most precise and most generally useful. Physical and chemical methods are particularly valuable as indicators of efficacy of sterilization, e.g., the use of chemical indicators of temperature in heat sterilization. F.R.L.

A75-12871 * # ***Viability of Bacillus subtilis spores exposed to space environment in the M-191 experiment system aboard Apollo 16.*** H. Bücker, G. Horneck, H. Wollenhaupt, M. Schwager (Frankfurt, University, Frankfurt am Main, West Germany), and G. R. Taylor (NASA, Johnson Space Center, Houston, Tex.). In: Life sciences and space research XII; Proceedings of the Sixteenth Plenary Meeting, Konstanz, West Germany, May 23-June 5, 1973.
Berlin, East Germany, Akademie-Verlag GmbH, 1974, p. 209-213. 13 refs.

During the Apollo 16 space flight, in the experiment system M-191, (microbial response to space environment) spores of Bacillus subtilis 168 were exposed to space vacuum or solar UV irradiation with a peak wavelength of 254 mm or both. The effects of these space factors on the colony-forming ability of the spores were studied. It was found (1) that space vacuum alone did not affect the survival of pre-dried spores; (2) that space vacuum in combination with solar UV irradiation with a peak wavelength of 254 nm had a synergistic effect, which may by attributed to a UV supersensitivity of the spores during vacuum exposure. These results agreed with findings of simulation experiments on earth. It was concluded that air dried spores may survive exposure to space vacuum if shielded against solar UV irradiation. (Author)

A75-12934 **The use of time dependent models in inverse electrocardiography.** C. M. Baker (Christian Brothers College, Memphis, Tenn.) and T. C. Pilkington (Duke University, Durham, N.C.). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Nov. 1974, p. 460-468. 16 refs. Grants No. NIH-HE-5716; No. NIH-HE-11307.

Investigation of the feasibility of using multiple dipole cardiac generators with time-dependent dipole moments for obtaining physiologically feasible inverse cardiographic solutions. The results obtained with three variously formulated models suggest that time-dependent inverse electrocardiography is a feasible approach and that it should be considered further. M.V.E.

A75-12969 # **The role of central and peripheral thermosensitive structures in the regulation of cold shivering (O roli tsentral'nykh i perefericheskikh termochuvstvitel'nykh struktur v reguliatsii kholodovoi drozhi).** Ia. A. Bedrov and B. I. Gekhman (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Sept. 1974, p. 1382-1388. 16 refs. In Russian.

A75-12970 # **Interhemisphere interrelationships in the visual cortex of cats during binocular and monocular stimulation (O mezhpolusharnykh vzaimootnosheniiakh v zritel'noi kore koshek pri binokuliarnoi i monokuliarnoi stimuliatsii).** V. L. Bianki and V. A. Kurochkin (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Sept. 1974, p. 1389-1396. 29 refs. In Russian.

A75-12971 # **Acetylcholine distribution in the retinal layers of the frog eye (Raspredelenie atsetilkholina v sloiakh setchatki glaza liagushki).** P. P. Zak, T. V. Lelekova, and M. A. Ostrovskii (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Sept. 1974, p. 1397-1403. 25 refs. In Russian.

A75-12972 # **The effect of a periodic decrease in the ambient temperature on the effectiveness of muscle adaptation to increased activity (Vliianie periodicheskogo snizheniia temperatury okruzhaiushchei sredy na effektivnost' adaptatsii myshts k povyshennoi deiatel'nosti).** Z. E. Kosenkova (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, Sept. 1974, p. 1404-1409. 25 refs. In Russian.

A75-13012 ***Ultrasound in the diagnosis of cardiovascular-pulmonary disease.*** Edited by C. R. Joyner (Pittsburgh, University; Allegheny General Hospital, Pittsburgh, Pa.). Chicago, Year Book Medical Publishers, Inc., 1974. 205 p. $22.50.

The principles of ultrasound and ultrasonic instrumentation are

considered along with questions of echocardiography of the atrioventricular valves and prosthetic valves, ultrasonic contrast technics in echocardiography, echocardiography of the left ventricular outflow tract and aortic valve, and the echographic measurement of cardiac chamber dimensions. Other subjects discussed include pericardial effusion diagnosed by echocardiography, the genesis of heart sounds and murmurs as demonstrated by echocardiography, vascular ultrasonography, and Doppler ultrasound detection of lower limb venous thrombosis. G.R.

A75-13013 The principles of ultrasound and ultrasonic instrumentation. C. R. Joyner (Pittsburgh, University; Allegheny General Hospital, Pittsburgh, Pa.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 1-14. 28 refs.

Questions of ultrasound propagation are considered, giving attention to the attenuation of ultrasound and the choice of frequencies and transducers. A single piezoelectric crystal functions on both transmitter and receiver of ultrasound in the pulsed reflection technic. Recording technics are discussed along with the control settings of the echograph instrument and aspects of B mode scanning. The use of the Doppler technic is described, taking into account nondirectional and directionally-sensitive Doppler devices and pulsed Doppler instruments. Questions regarding the safety aspects of diagnostic ultrasound are also explored. G.R.

A75-13014 Ultrasonic contrast technics in echocardiography. R. Gramiak and P. M. Shah (Rochester, University, Rochester, N.Y.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 45-56. 12 refs.

The ultrasonic examination of a patient during cardiac output studies with indocyanine green resulted in the development and the conceptual definition of intracardiac contrast agents for ultrasonography. Cardiac anatomy studies are considered, taking into account the mitral valve, the aortic valve, the tricuspid valve, the pulmonic valve, the interatrial septum, the coronary sinus, intracardiac shunts, and questions of valvular regurgitation. G.R.

A75-13015 Echocardiography of the left ventricular outflow tract and aortic valve. R. Gramiak and P. M. Shah (Rochester, University, Rochester, N.Y.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 57-74. 26 refs.

A75-13016 * Cardiac chamber size and volume - Echographic measurement of cardiac chamber dimensions, volume and ventricular function. R. L. Popp and D. C. Harrison (Stanford University, Stanford, Calif.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 75-109. 84 refs. Grants No. NIH-HL-5866; No. NIH-HL-5079; No. NIH-HL-14174; No. NGL-05-020-305.

A75-13017 Genesis of heart sounds and murmurs as demonstrated by echocardiography. E. Craige (North Carolina, University, Chapel Hill, N.C.) and N. J. Fortuin (Johns Hopkins University, Baltimore, Md.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 119-132. 45 refs.

A75-13018 Vascular ultrasonography. B. B. Goldberg (Temple University; Episcopal Hospital, Philadelphia, Pa.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 133-154. 23 refs.

The importance of the ultrasonic measurement of vessel size is related to the fact that it can be used on individuals who are too old or too sick to tolerate contrast studies, or on whom catheterization cannot be performed satisfactorily for technical reasons. Examinations of the abdominal aorta are discussed, taking into account A and M scans and two-dimensional scanning. Studies of the descending thoracic aorta are considered along with investigations of the ascending thoracic aorta, the aortic arch, the pulmonary artery, and the left atrium. G.R.

A75-13019 The transcutaneous Doppler velocity detector for the study of arterial disease and cardiac dysfunction. C. R. Joyner (Pittsburgh, University; Allegheny General Hospital, Pittsburgh, Pa.). In: Ultrasound in the diagnosis of cardiovascular-pulmonary disease. Chicago, Year Book Medical Publishers, Inc., 1974, p. 176-189. 35 refs.

A75-13020 # Fundamentals of the theory of radio reception of discrete signals: Synthesis and analysis (Osnovy teorii radiopriema diskretnykh signalov: Sintez i analiz). L. I. Filippov. Moscow, Izdatel'stvo Nauka, 1974. 192 p. 34 refs. In Russian.

The monograph presents a systematic statement of present-day theory of optimal radio reception of discrete signals passing through a channel in the presence of interferences and undergoing random parameter modifications. The discussion is concerned with both narrow-band and wideband signals. Following an introduction to the underlying theoretical fundamentals and a description of the models adopted, the properties of signal transmission channels are reviewed and the mathematical synthesis of discrete radio signal receivers are discussed. In conclusion, an analysis of radio receiving devices is presented. M.V.E.

STAR ENTRIES

N75-10557* Environmental Research Inst. of Michigan, Ann Arbor.
UTILITY OF ERTS FOR MONITORING THE BREEDING HABIT OF MIGRATORY WATERFOWL
Edgar W. Work, Jr., David S. Gilmer (Northern Prairie Wildlife Res. Center), and A. T. Klett (Northern Prairie Wildlife Res. Center) *In* NASA. Goddard Space Flight Center Third ERTS Symp., Vol. 2 May 1974 p 102-115 refs

CSCL 06C

Waterfowl breeding-ground surveys conducted each year by the Bureau of Sport Fisheries and Wildlife extend over a vast regivn of the United States and Canada. Data from these surveys are used to estimate waterfowl production by means of a mathematical model. Counts of May and July ponds are some the variables used in this model. Annual production estimates are used to predict fall flights of ducks. This information is then used for establishing waterfowl hunting regulations. Work to date indicates that satellite remote sensing techniques hold considerable promise for the accurate and rapid assessment of waterfowl breeding habitat, especially changes in pond numbers and distribut: n. Development of an operational system utilizing satellite sensors as a primary source of data appears to be a realistic goal for the future. Author

N75-10677 Auburn Univ., Ala.
THE EFFECTS OF LUNAR CYCLES AND DIURNAL RHYTHMS ON ACTIVITY, EXPLORATION, AND ELICITED AGGRESSION IN RATS AND MICE Ph.D. Thesis
Delmar Stanley Paul Bisbee 1974 198 p
Avail: Univ. Microfilms Order No. 74-19372

The effects of the phases of the moon on general activity, exploration, elicited agression, animal body weight, and the stability of these effects across three consecutive lunar months are studied. The relative effects of night and day on activity, exploration, and aggression, and the normal monthly activity cycle of rats in a running wheel are also observed. The findings are (1) activity in rats follows a lunar cycle pattern of differences across phases with peaks at the full and new moon; (2) activity in mice shows a pattern of phase differences with a peak at the first quarter; (3) exploration measures did not show lunar influences; (4) aggression measures demonstrate differences across phases, with a peak at the new moon; (5) both rats and mice have a higher level of general activity at night than during the day; and (6) comparisons of general and running wheel activity show similarities in lunar month patterns. Dissert. Abstr.

N75-10678*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SELF-STERILIZATION OF BODIES DURING OUTER PLANET ENTRY
A. R. Hoffman, W. Jaworski, and D. M. Taylor Jun. 1974 21 p refs Presented at the 17th Plenary Meeting of COSPAR, Sao Paulo, Brazil, 17 Jun. - 1 Jul. 1974
(Contract NAS7-100)
(NASA-CR-140808; Paper-L.4.2) Avail: NTIS HC $3.25 CSCL 06M

A body encountering the atmosphere of an outer planet is subjected to heat loads which could result in high temperature conditions that render terrestrial organisms on or within the body nonviable. To determine whether an irregularly shaped entering body, consisting of several different materials, would be sterilized during inadvertent entry at high velocity, the thermal response of a typical outer planet spacecraft instrument was studied. The results indicate that the Teflon insulated cable and electronic circuit boards may not experience sterilizing temperatures during a Jupiter, Saturn, or Titan entry. Another conclusion of the study is that small plastic particles entering Saturn from outer space have wider survival corridors than do those at Jupiter. Author

N75-10679*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 27: RADIOBIOLOGY AND GENETICS OF ARABIDOPSIS
V. I. Ivanov Washington NASA Oct. 1974 192 p refs Transl. into ENGLISH from the book "Problemy Kosmicheskoy Biologii. Tom. 27. Radiobiologiya i Genetika Arabidopsisa" *Moscow, Nauka Press*, 1974 p 1-191
(Contract NASw-2481)
(NASA-TT-F-15849) Avail: NTIS HC $7.00 CSCL 06C

Arabidopsis thaliana is discussed as an optimum object of aerospace research on radiobiology, radiation genetics and general botanical research. Varied aspects of plant research are considered; survival, growth, development, fertility, effects of irradiation, sexual and asexual reproduction under zero gravity. The importance of the abundance of arabidopsis mutants and their small size are cited as some of the important merits of this plant's use as an object of space research. Author

N75-10680# Centraal Instituut voor Voedingsonderzoek TNO, Zeist (Netherlands).
EFFECT OF STRESS ON FAT METABOLISM IN CONNECTION WITH FAT CONTENTS OF EMERGENCY RATIONS [DE INVLOED VAN STRESS OP DE VETSTOFWISSELING IN VERBAND MET HET VETGEHALTE VAN NOODRANTSOENEN]
W. VanDokkum, comp. Dec. 1973 27 p refs In DUTCH
(R-4255) Avail: NTIS HC $3.25

A literature survey on the effects which physiological and psychic stress can have on fat metabolism is presented in connection with an investigation aimed at reducing the fat content of emergency rations for the armed forces. Some data are given on the caloric constitution of a number of emergency rations discussed in literature. It is concluded that as a result of the accumulation of ketone compounds in the blood, stress can have an unfavorable effect on fat metabolism, and therefore on water balance and physical work. It is recommended that the fat contents of emergency rations be reduced to about 20% in favor of carbohydrates. ESRO

N75-10681# Florida State Univ., Tallahassee.
THE COHO PROJECT: LIVING RESOURCES PREDICTION FEASIBILITY STUDY, VOLUME 1 Final Report
James J. Brien, Bruce M. Woodworth, and David J. Wright 1974 37 p refs Prepared in cooperation with Oregon State Univ.
(Grants NOAA-043-022-28; NSF GX-33502)
(PB-234057/8; NSF/IDOE-74-18) Avail: NTIS HC $3.25 CSCL 08C

The Coho project demonstrated a system which provides a substantial improvement in fish finding technique. It is the first known system which combines oceanographic and meteorological variables with the knowledge that certain species are temperature dependent, in order to arrive at an accurate forecast of the location of harvestable concentrations of salmon. The area chosen to test the prediction system was off the central coast of Oregon between Cape Lookout and Seal Rock. GRA

N75-10682# Florida State Univ., Tallahassee.
THE COHO PROJECT: LIVING RESOURCES PREDICTION FEASIBILITY STUDY. VOLUME 2: ENVIRONMENTAL REPORT
James J. OBrien, Bruce M. Woodworth, and David J. Wright 1974 191 p Prepared in cooperation with Oregon State Univ.
(Grants NOAA-043-022-28; NSF GX-33502)
(PB-234058/6; NSF/IDOE-74-19) Avail: NTIS HC $5.50 CSCL 06C

The Coho project was a pilot project to study the application of remote sensing techniques for the benefit of the Central Oregon offshore Coho fishery. The system, designed to provide a true daily forecast of environmental factors conductive to concentrations of harvestable stocks of Coho salmon, was operated to include the offshore area between Cape Lookout (45 deg 20.5 min N) and Seal Rock (44 deg 30 min N) along the Central Oregon coast, during the period June 15, 19 1973, to August

16, 1973. This volume contains the data on all relevant environmental factors utilized in the prediction studies. GRA

N75-10683# Florida State Univ., Tallahassee.
THE COHO PROJECT: LIVING RESOURCES PREDICTION FEASIBILITY STUDY. VOLUME 3: SYSTEM EVALUATION REPORT
James J. OBrien, Bruce M. Woodworth, and David J. Wright 1974 64 p Prepared in cooperation with Oregon State Univ.
(Grants NOAA-043-022-28; NSF GX-33502)
(PB-234059/4; NSF/IDOE-74-20) Avail: NTIS HC $3.75 CSCL 06C

The Coho salmon is known to be a temperature dependent species preferring the relatively warm waters in the 52 degrees to 56 degrees Fahrenheit range. The upwelling phenomenon, on the other hand, brings cold water into the Coho habitat thus tending to drive the fish away. The cold water, however, is laden with nutrients which stimulate the initial phases of the food chain at the top of which exists the salmon. It is to be expected, and was presumed in this study, that Coho would be found on the warmer side of the interface of the upwelled and stabilized waters. This volume is devoted to the evaluation of a pilot prediction system operating off the central Oregon coast. The economic merits along with some unfavorable comments are set forth. GRA

N75-10685*# Linguistic Systems, Inc., Cambridge, Mass.
MOTION SICKNESS
N. Razsolov and K. Andronik Washington NASA Oct. 1974 7 p Transl. into ENGLISH from Med. Gaz. (USSR), 24 May 1974 p 3
(Contract NASw-2482)
(NASA-TT-F-15864) Avail: NTIS HC $3.25 CSCL 06E

The theory and prophylaxis of motion sickness are reviewed. The V.I. Voyachkov and K.L. Khilov otolith theory of the causes of motion sickness is discussed, and G.L. Komendantov's definition of four stages of motion sickness is outlined. Further studies of the pathogenesis of the disease are mentioned. It is noted that double-axis rotation with intermittent and continuous Coriolis accelerations is used to test candidates for piloting and other occupations. Drug therapy now in use for motion sickness is described: the drug now in use is plavefin (the one previously used, 'Aeron', was ineffective and caused severe side effects). Also mentioned are suppositories with 0.3 to 0.7 g of sodium bicarbonate which are used daily for 21 days. However, 50 ml of a 4 to 5% solution of sodium hydrocarbonate administered intravenously appears to be the most effective pharmaceutical means of inhibiting the development of motion sickness. Author

N75-10686*# Techtran Corp., Glen Burnie, Md.
ALTERATIONS OF COLOR SENSATION UNDER HYPOXIC CONDITIONS
B. S. Frantzen and A. I. Yusfin Washington NASA Oct. 1974 13 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 44, no. 6, 1958 p 519-525
(Contract NASw-2485)
(NASA-TT-F-15879) Avail: NTIS HC $3.25 CSCL 06S

The influence of oxygen deficiency on color discrimination was investigated. Oxygen deficiency at moderate altitudes (2000 to 3000 M) seems to increase color discrimination; at higher altitudes (6000 to 7000m) it decreases. It was found that the greater the visual acuity of a set of receptors at sea level, the greater their reduction from oxygen deficiency at higher altitudes. Author

N75-10687*# Scientific Translation Service, Santa Barbara, Calif.
THE PROBLEM OF HUMAN STATOKINETIC STABILITY IN AVIATION AND SPACE MEDICINE
V. I. Kopanev Washington NASA Oct. 1974 52 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, 1974 p 476-498
(Contract NASw-2483)
(NASA-TT-F-15933) Avail: NTIS HC $4.25 CSCL 06P

A scientific basis for statokinetic stability is provided. The character of its changes under conditions of aviation and space flight is described, and ways of preventing statokinetic disorders are identified. Statokinetic stability is defined as the capacity of the organism to maintain stable working capacity, spatial orientation, and the function of equilibrium during the organism's exposure to factors that appear during passive and active movements in space (accelerations, optokinetic stimuli). Author

N75-10688*# Kanner (Leo) Associates, Redwood City, Calif.
MAN IN SPACE ORBIT
S. P. Umanskiy Washington NASA Oct. 1974 109 p refs Transl. into ENGLISH of the book "Chelovek na Kosmicheskoy Orbite" Moscow, Mashinostr. Press, 1974 p 1-139
(Contract NASw-2481)
(NASA-TT-F-15973) Avail: NTIS HC $5.25 CSCL 06P

A brief description of earth and its environment in space is given, as well as the effects of flight on the human body. Manned spacecraft, their life support systems and means of rescue are described and illustrated in some detail. Discussion, data and illustrations of astronauts equipment, including personal, protective, emergency rescue equipment and means of moving in open space detailing descriptions of space suits and various existing and planned vehicles for movement on the surface of the moon are described and illustrated. Author

N75-10689*# Scientific Translation Service, Santa Barbara, Calif.
THE DEPENDENCE OF REACTION TIMES ON THE LOCATION OF THE STIMULUS
G. S. Hall Washington NASA Oct. 1974 16 p refs Transl. into ENGLISH from Arch. Anatomie Physiol. (West Germany), 1879 p 1-10
(Contract NASw-2483)
(NASA-TT-F-16001) Avail: NTIS HC $3.25 CSCL 06P

Reaction times to stimuli were measured using simple apparatus in the upper arm, index finger and retina. It is found that reduced reaction times are not noticeably different for various parts of the body. In the case of the eye, the reaction times are similar to other functions. Therefore, the reaction method cannot be used to determine the sensible and motor conduction velocity and at the present time, the conduction velocity in the long paths of the spine are unknown. Author

N75-10690*# California Univ., Berkeley. White Mountain Research Station.
IN VIVO MEASUREMENT OF HUMAN BODY COMPOSITION Semiannual Status Report, 1 Jan. - 30 Jun. 1974
Nello Pace, Benjamin W. Grunbaum, Arthur M. Kodama, and David C. Price 30 Jun. 1974 101 p
(Grant NGR-05-003-470)
(NASA-CR-140668; SASR-4) Avail: NTIS HC $5.25 CSCL 06P

The female bed rest study has shown that, the response of women to prolonged recumbency of 2 to 3 weeks duration is very similar to that displayed by men. Some of the key findings in the women after 17 days of continuous recumbency are: (1) a decrease in plasma volume of 12-13 per cent; (2) a small decrease in total body water; (3) a decrease in total body potassium of 3 to 4 per cent; (4) a decrease in plasma potassium concentration of 4 to 5 per cent; (5) a decrease in total circulating plasma protein of 11 to 12 per cent; (6) a decrease in urinary norepinephrine excretion rate of 27 to 28 per cent; (7) a possible increase in urinary magnesium, calcium, and phosphate excretion rates; and (8) a possible increase in urinary citrate excretion rate. Author

N75-10691*# Texas Univ., Houston. School of Public Health.
PROBABILITY OF ILLNESS DEFINITION FOR THE SKYLAB FLIGHT CREW HEALTH STABILIZATION PROGRAM Final Report
[1974] 96 p
(Contract NAS9-12783)
(NASA-CR-140300) Avail: NTIS HC $4.75 CSCL 06E

Management and analysis of crew and environmental microbiological data from SMEAT and Skylab are discussed. Samples were collected from ten different body sites on each SMEAT and Skylab crew-member on approximately 50 occasions and since several different organisms could be isolated from each sample, several thousand lab reports were generated. These lab reports were coded and entered in a computer file and from the file various tabular summaries were constructed. Author

N75-10692# Oregon State Univ., Corvallis. Dept. of Agricultural Economics.
OUTPATIENT MEDICAL COSTS RELATED TO AIR POLLUTION IN THE PORTLAND, OREGON AREA
John A. Jaksch and Herbert H. Stoevener Washington, D. C. EPA Jul. 1974 133 p refs
(Contract EPA-68-01-0423)
(EPA-600/5-74-017) Avail: SOD HC $2.00

The effects of air pollution on the consumption of outpatient medical services were quantified in monetary terms, according to the hypotheses were that air pollution can aggravate a state of health resulting in increased consumption of outpatient medical services and in the number of contacts with the medical system for certain respiratory, cardiovascular, and other diseases aggravated by air pollution. The study period was 1969-1970, and centered in the Portland, Oregon area. Statistical models were formulated, explaining individual outpatient consumption of medical services. Measures of suspended particulate air pollution and meteorological conditions, as well as socioeconomic-demographic variables thought to influence the consumption of medical services, were included in the models as explanatory variables. Author

N75-10693*# California Univ., San Diego. Dept. of Radiology.
A SIMPLE METHOD FOR THE GENERATION OF ORGAN AND VESSEL CONTOURS FROM ROENTGENOGRAPHIC OR FLUOROSCOPIC IMAGES
John D. Newell, Robert A. Keller, and Norman A. Baily [1974] 13 p refs
(Grant NGR-05-009-257)
(NASA-CR-140685) Avail: NTIS HC $3.25 CSCL 06E

A simple method for outlining or contouring any area defined by a change in film density or fluoroscopic screen intensity is described. The entire process, except for the positioning of an electronic window, is accomplished using a small computer having appropriate softwave. The electronic window is operator positioned over the area to be processed. The only requirement is that the window be large enough to encompass the total area to be considered. Author

N75-10694*# Wisconsin Univ., Madison. Bone Mineral Lab.
APPLICATIONS OF THE DIRECT PHOTON ABSORPTION TECHNIQUE FOR MEASURING BONE MINERAL CONTENT IN VIVO. DETERMINATION OF BODY COMPOSITION IN VIVO Annual Progress Report, 15 Jul. 1971 - 15 Jul. 1972
John R. Cameron 1 Aug. 1972 157 p refs
(Grant NGR-50-002-051; Contract AT(11-1)-1422)
(NASA-CR-140708) Avail: NTIS HC $6.25 CSCL 06P

The bone mineral content, BMC, determined by monoenergetic photon absorption technique, of 29 different locations on the long bones and vertebral columns of 24 skeletons was measured. Compressive tests were made on bone from these locations in which the maximum load and maximum stress were measured. Also the ultimate strain, modulus of elasticity and energy absorbed to failure were determined for compact bone from the femoral diaphysis and cancellous bone from the eighth through eleventh thoracic vertebrae. Correlations and predictive relationships between these parameters were examined to investigate the applicability of using the BMC at sites normally measured in vivo, i.e. radius and ulna in estimating the BMC and/or strength of the spine or femoral neck. It was found that the BMC at sites on the same bone were highly correlated $r = 0.95$ or better; the BMC at sites on different bones were also highly interrelated, $r = 0.85$. The BMC at various sites on the long bones could be estimated to between 10 and 15 per cent from the BMC of sites on the radius or ulna. Author

N75-10695*# Wisconsin Univ., Madison. Bone Mineral Lab.
SKELETAL STATUS AND SOFT TISSUE COMPOSITION IN ASTRONAUTS. TISSUE AND FLUID CHANGES BY RADIONUCLIDE ABSORPTIOMETRY IN VIVO Annual Progress Report, 15 Jul. 1972 - 15 Jul. 1973
John R. Cameron, Richard B. Mazess, and Charles R. Wilson 1 Aug. 1973 153 p refs
(Grants NGR-50-002-051; NGR-50-002-183; Contract AT(11-1)-1422)
(NASA-CR-140689) Avail: NTIS HC $6.25 CSCL 06P

A device has been constructed and tested which provides immediate readout of bone mineral content and bone width from absorptiometric scans with low energy radionuclides. The basis of this analog system is a logarithmic converter-integrator coupled with a precision linear ratemeter. The system provided accurate and reliable results on standards and ashed bone sections. Clinical measurements were made on about 100 patients with the direct readout system, and these were highly correlated with the results from digital scan data on the same patients. The direct readout system has been used successfully in field studies and surveys as well as for clinical observations. Author

N75-10696*# Wisconsin Univ., Madison. Bone Mineral Lab.
SKELETAL STATUS AND SOFT TISSUE COMPOSITION IN ASTRONAUTS. TISSUE AND FLUID CHANGES BY RADIONUCLIDE ABSORPTIOMETRY IN VIVO Annual Progress Report, 15 Jul. 1973 - 15 Jul. 1974
John R. Cameron, Richard B. Mazess, and Charles R. Wilson 1 Aug. 1974 154 p refs
(Grants NGR-50-002-051; NGR-50-002-183; Contract AT(11-1)-1422)
(NASA-CR-140703) Avail: NTIS HC $6.25 CSCL 06P

Research on the measurement of bone mineral content and body composition ranges from isotopic tracer methods and the adoption of clinical standards to osteoporosis therapy and the effects of nutritional factors on bone loss. G.G.

N75-10697# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
INVESTIGATIONS ON THE DAY-NIGHT-DIFFERENCES OF PHYSICAL PERFORMANCE CAPACITY Ph.D. Thesis - Bonn Univ.
Dietmar Weddige 25 Mar. 1974 71 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-29) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 26,50 DM

To investigate day-night differences of physical performance capacity, the maximal oxygen uptake in 16 male subjects during the day and the night was measured. Maximal oxygen uptake was slightly but statistically significantly higher during the night. In view of the fact, that at the same time maximal working time and performance were significantly lower, a poorer effectiveness during the night must be assumed. Author (ESRO)

N75-10698# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
ORAL AND RESPIRATORY IMMUNIZATION [ORALE EN RESPIRATOIRE IMMUNISATIE]
H. C. Bartlema 1974 8 p refs In DUTCH
(MBL-1974-4) Avail: NTIS HC $3.25

The possibility of using oral and respiratory vaccines in the treatment of infectious diseases is considered. The advantage of this type of local immunization was examined in regard to infections which act only on those organs forming the entry gate, and in comparison to those cases in which parenteral vaccination would be advantageous. ESRO

N75-10699# Unilever Research, Vlaardingen (Netherlands).
MEASUREMENT OF PLATELET AGGREGATION IN FLOWING BLOOD WITH THE USE OF A FILTER
G. Hornstra and S. Y. Gielen [1973] 21 p refs Submitted for publication
Avail: NTIS HC $3.25

Techniques are presented to measure ADP-induced platelet aggregation in circulating arterial rat blood and spontaneous aggregation in flowing venous blood of man. The filter-loop technique is a valuable method in assessing the in vivo effects of drugs and dietary treatment on platelet aggregation tendency The anti-thrombotic effect of aspirin was confirmed, as was the effect of some haemostatic disorders. The anti-aggregating effect of dietary linoleic acid was shown convincingly. The filtragometer seems very useful as an additional device in thrombosis research. Author (ESRO)

N75-10700# Flying Personnel Research Committee, London (England).
THE GENERATION OF SACCADIC EYE MOVEMENTS IN VESTIBULAR NYSTAGMUS
G. R. Barnes Sep. 1973 38 p refs
(AD-784128; FPRC-1325) Avail: NTIS CSCL 06/16

A model has been developed for the mechanism of saccadic generation in the vestibulo-ocular reflex arc, in an attempt to explain variations in the pattern of nystagmic response to vestibular stimulation. The model has been developed using an analogue computer and an attempt has been made to relate the system to the known physiological evidence. The response of the model has been compared with results from experiments on human subjects, and satisfactory agreement has been obtained in conditions appropriate to stimulation of the canals by both periodic and transient angular accelerations and further, to stimulation of the utricular maculae by linear acceleration. The model effectively simulates the changes in frequency and duration of slow phase and saccadic eye movements observed in experiments.
Author (GRA)

N75-10701# Lecler (Michel), Inc., Harvey, La.
REPORT ON PROJECT HYDROX 2 Final Report
Peter O. Edel 15 Aug. 1974 75 p refs
(Contract N00014-73-C-0233)
(AD-784446) Avail: NTIS CSCL 06/19

Since the world's supply of helium resources is diminishing, future deep diving operations may depend on substitutes for helium in breathing mixtures. On the basis of its physical constants, hydrogen would seem to be the most promising replacement for helium as an oxygen diluent in breathing mixtures for human exposure to very high pressures. The experimental program involved four volunteer diver-subjects, each of whom was exposed on two separate occasions to 7.06 absolute atmosphere (ATA) for a period of 113 minutes while breathing a mixture of 97%H2-3%O2 for a total number of 24 dives. Each subject was exposed to each breathing mixture twice during the program. During the exposures, a work load was performed by the subjects and performance measurements were made. The subjects: responses to decompression profiles for the three oxygen diluents were evaluated to provide provisional values with regard to hydrogen concerning uptake and elimination time for gas transport in the human body. (Modified author abstract) GRA

N75-10702# Rensselaer Polytechnic Inst., Troy, N.Y.
HIGH ALTITUDE PULMONARY EDEMA Annual Progress Report, 1 May 1973 - 30 Apr. 1974
Gerald Moss Jun. 1974 56 p refs
(Contract DADA17-72-C-2121)
(AD-782240; APR-2) Avail: NTIS CSCL 06/5

A centrineurogenic etiology for the pulmonary lesions of high altitude pulmonary edema (HAPE) and oxygen toxicity (OT). The authors developed canine models for induction of these lesions in the unanesthetized beagle with respiratory hypoxia or 100% O2 at ambient pressure and at elevated pressures. A discussion of the experimental results is reported. GRA

N75-10703# National Research Council, Washington, D.C. Committee on Toxicology.
A REVIEW OF THE TOXICOLOGY RESEARCH PROGRAM OF THE 6570TH AEROSPACE MEDICAL RESEARCH LABORATORY, WRIGHT-PATTERSON AIR FORCE BASE, OHIO Final Report, Sep. 1973 - Jun. 1974
Jun. 1974 78 p refs
(Contract N00014-67-A-0244-0015)
(AD-782249; NRC-TOX-P795) Avail: NTIS CSCL 06/20

The Committee on Toxicology of the National Academy of Sciences-National Research Council, concluded that there is good reason for the Air Force to maintain an independent laboratory for toxicology research. It found the toxicology evaluation program to be functioning well and providing information and services adequate for Air Force needs. It reported that the methods are appropriate, the research is productive, and the program is relevant to the Air Force needs. It noted that the Air Force has established cooperative programs with other federal and civilian agencies to avoid duplication of effort on common problems. It suggested that some auxiliary functions, e.g., the advisory function and fundamental research, could be strengthened. GRA

N75-10704# Air Force Academy, Colo.
FOIL ACTIVATION ANALYSIS AND THERMOLUMINESCENT DOSIMETRY ON SKYLAB 2 Final Report, Apr. 1973 - Jul. 1974
Louis F. Wailly, John W. Watters, and Peter B. Carter Jul. 1974 27 p refs
(AD-783779; USAFA-TR-74-11) Avail: NTIS CSCL 06/18

The Skylab II Command Module was equipped with passive dosimeter located at five selected stations within the spacecraft to monitor radiation levels accumulated during the 28 day space mission. The passive sensors consisted of an array of thermoluminescent devices (TLD) ionization chambers, and activation foils. The thermoluminescent units chosen were the EG and G Corporation evaculated glass container type. Both lithium fluoride and manganese activated calcium fluoride were selected for use in the Skylab missions. (Modified author abstract) GRA

N75-10705# Army Foreign Science and Technology Center, Charlottesville, Va.
STATOKINETIC REACTIONS OF MAN UNDER CONDITIONS OF SHORT TERM WEIGHTLESSNESS
I. A. Kolosov 22 Feb. 1974 15 p refs Transl. into English from Izv. Akad. Nauk SSR, Ser. Biol. (USSR) no. 5, 1969 p 736-741
(AD-784142; FSTC-HT-23-0291-74) Avail: NTIS CSCL 06/19

The purpose of the study was to investigate the character and acuteness of statokinetic reactions of man under conditions of short duration weightlessness and their dependence on past flight experience, to elaborate criteria for evaluating statokinetic resistance to short duration weightlessness, and to study the adaptive capacities of the organism. The test subjects underwent multiple physiological studies of their sensory, vegetative, motor, and vestibulo-somatic reactions. During the familiarization flights for weightlessness, most of the test subjects showed statokinetic disturbances in the form of psychosensory, vegetative, and motor disorders. The degree of acuteness of the statokinetic disturbances was found to be in inverse relation to the previous flight experience of the test subjects, with disturbances being observed in 16.7% of the pilots and in 81.9% of the non-pilots during the first familiarization flights. GRA

N75-10706# Advisory Group for Aerospace Research and Development, Paris (France).
COLD: PHYSIOLOGY, PROTECTION AND SURVIVAL
Fridtjov Vogt Lorentzen (Roy. Norwegian Air Force, Oslo) Aug. 1974 44 p refs
(AGARD-AG-194; AGARDograph-194) Avail: NTIS HC $3.75

The possibility of survival in a cold environment alone or in combination with other physical stresses, lies more in the field of technology and engineering, than in modifying human physiology. Practical points concerning survival techniques and equipment are discussed. The more serious problem encountered by a single man with simple equipment which has the highest possible efficiency/weight ratio is considered. Author

N75-10707*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PLANETARY QUARANTINE: SPACE RESEARCH AND TECHNOLOGY Semiannual Review, 1 Jan. - 30 Jun. 1974
30 Sep. 1974 126 p refs
(Contract NAS7-100)
(NASA-CR-140806; JPL-900-675) Avail: NTIS HC $5.75 CSCL 06M

The impact of satisfying satellite quarantine constraints on current outer planet mission and spacecraft designs is considered. Tools required to perform trajectory and navigation analyses for determining satellite impact probabilities are developed. Author

N75-10708*# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
MODELS OF SUBJECTIVE RESPONSE TO IN-FLIGHT MOTION DATA
A. N. Rudrapatna and I. D. Jacobson Jul. 1973 55 p refs
(Grant NGR-47-005-181)
(NASA-CR-140675; TR-403209) Avail: NTIS HC $4.25 CSCL 05E

Mathematical relationships between subjective comfort and environmental variables in an air transportation system are investigated. As a first step in model building, only the motion variables are incorporated and sensitivities are obtained using stepwise multiple regression analysis. The data for these models have been collected from commercial passenger flights. Two models are considered. In the first, subjective comfort is assumed to depend on rms values of the six-degrees-of-freedom accelerations. The second assumes a Rustenburg type human response function in obtaining frequency weighted rms accelerations, which are used in a linear model. The form of the human response function is examined and the results yield a human response weighting function for different degrees of freedom. Author

N75-10709# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MEASUREMENT, EVALUATION, PREDICTION AND IMPROVEMENT OF AIRCRAFT RIDE Final Technical Report
Alvin B. Broderson Aug. 1973 43 p refs
(AF Proj. 7231)
(AD-783803; AMRL-TR-73-4) Avail: NTIS CSCL 05/5

The interrelated roles of the aircraft designer, flight dynamics specialist, and biomedical researcher are discussed as they relate to the various problems, definitions, procedures, and needs associated with measuring, evaluating, predicting, and improving aircraft ride. The importance of precise definitions and taxonomy for overall problem solution is emphasized. Standard and accurate vibration measurement techniques are discussed. Evaluation of ride in existing aircraft is discussed and distinguished from prediction of ride in proposed aircraft in regard to appropriate goals, limits, and criteria. Proper approaches for using gust environment, aircraft, and human frequency characteristics are discussed. Seat cushion, active isolation, and airframe dynamic control techniques for improving ride are discussed. Recommendations are made for improved biomedical research efforts to determine how and why vibration adversely affects aircraft pilots, crew and passengers, with emphasis on the need for closer dialogue and planning between the originator and user of biomedical research related to problems of aircraft ride.
Author (GRA)

N75-10710# Army Foreign Science anp Technology Center, Charlottesville, Va.
FOOD UNIT, BASED ON RESERVES OF DEHYDRATED PRODUCTS, IN LIFE SUPPORT SYSTEMS FOR CREWS OF SPACESHIPS DURING PROLONGED FLIGHTS
V. P. Bychkov 26 Feb. 1974 23 p refs Transl. into ENGLISH from Probl. Kosm. Biol. (USSR), v. 16, 1971 p 254-269
(AD-784289; FSTC-HT-23-1651-73) Avail: NTIS CSCL 06/8

Experiments were carried out to study the effects of dehydrated foods for crews of spaceships during prolonged flights. Those undergoing the tests were given dehydrated food equal in protein, carbohydrates and fats, to that eaten by people not carrying out manual work. The health, over a 4-month period, did not suffer, although there was a reduction in weight of examinees who weighed more than 75 kg at the outset. GRA

N75-10711# School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGIC TESTING OF THE T-43 PASSENGER OXYGEN MASK Final Report, Dec. 1973 - Jan. 1974
William E. Pepelko Jun. 1974 15 p refs
(AF Proj. 7164)
(AD-783237; SAM-TR-74-9) Avail: NTIS CSCL 06/11

The passenger oxygen mask planned for use in the T-43 aircraft was tested for 3 hours at 25,000 ft equivalent altitude (282 mm Hg) in an altitude chamber. Ambient temperature was maintained at 65F. Six volunteer subjects were used. Inspired P(O2) averaged 195 mm Hg with a minimum of 122 mm Hg for any subject averaged over a 10-minute period. End-expired P(O2) averaged 143 mm Hg with a minimum of 103 mm Hg for any 10-minute period. End-expired P(CO2) averaged 34.2 mm Hg and respiration rate 14.6 breaths/min. The mean inspired and expired pressures in the mask averaged -0.54 inches of H2O and -0.18 inches of H2O respectively. No deterioration of performance could be detected with psychomotor testing. The mask was well accepted with no reports of discomfort. All runs were completed successfully with no evidence of hypoxia. It was concluded that the mask performed adequately under the test conditions over the 3-hour test period. Author (GRA)

N75-10712*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CONSIDERATION OF PROBABILITY OF BACTERIAL GROWTH FOR JOVIAN PLANETS AND THEIR SATELLITES
D. M. Taylor, R. M. Berkman, and N. Divine Jun. 1974 18 p refs Presented at Joint Open Meeting of the Panel on Planetary Quarantine and Working Group 5, 17th Planetary Meeting of COSPAR, Sao Paulo, Brazil, 17 Jun. - 1 Jul. 1974
(Contract NAS7-100)
(NASA-CR-140807; Paper-V.4.4) Avail: NTIS HC $3.25 CSCL 06M

Environmental parameters affecting growth of bacteria are compared with current atmospheric models for Jupiter and Saturn, and with the available physical data for their satellites. Different zones of relative probability of growth are identified for Jupiter and Saturn. Of the more than two dozen satellites, only the largest (Io, Europa, Ganymede, Callisto, and Titan) are found to be interesting biologically. Titan's atmosphere may produce a substantial greenhouse effect providing increased surface temperatures. Models predicting a dense atmosphere are compatible with microbial growth for a range of pressures at Titan's surface. For Titan's surface the probability of growth would be enhanced if: (1) the surface is entirely or partially liquid; (2) volcanism is present; or (3) access to internal heat sources is significant. Author

N75-11586 Nauka Press, Moscow (USSR).
PROBLEMS OF SPACE BIOLOGY. VOLUME 22: EXCHANGE OF MATTER UNDER EXTREMUM CONDITIONS OF SPACE FLIGHT AND ITS SIMULATION [PROBLEMY KOSMICHESKOY BIOLOGII. TOM 22: OBMEN VESHCHESTEV V EKSTREMALNYKH USLOVIYAKH KOSMICHESKOY POLETA I PRI YEGO IMITATSII]
I. S. Balakhovskiy, Yu. V. Natochin, and V. N. Chernigovskiy, ed. 1973 211 p refs In RUSSIAN
Copyright. Avail: Issuing Activity

A ten-year experimental study of exchange processes in cosmonauts engaged in space flight is described. The results are compared with those from simulation studies and data published by American researchers. Excretion of water and salt during and after flight are discussed in detail. Detailed consideration is given to methods of clinical biology which were worked out for space medicine: Microchemical blood analyses, mass hemoglobin determination, and waste. General problems of water transport to osmoregulatory organs and the regulation of water-salt exchange are also reviewed.

N75-11587 Nauka Press, Moscow (USSR).
METHODS IN SPACE BIOLOGY, PART 1 [METODY KOSMICHESKOY BIOKHIMII, CHAST 1]
In its Probl. of Space Biol., Vol. 22 1973 p 6-88 In RUSSIAN

Various methods of biological analysis applicable to space biology are considered: a rapid method of biochemical analysis, dried blood studies, microchemical blood analysis, determination of the volume of circulating blood and its rate of transfer, determination of carboxyhemoglobin content in blood, and determination of the amount of absorbed CO in blood. Large and small filter blood sample analyses are considered, involving obtaining trichloroacetic acid extract for determining water-soluble material; determination of blood sugar, lactic acidurea, creatinine, fat-soluble material, cholesterol lipid phosphorus, and iron; titration determination of non-esterified fatty acids; and determination of glucose by fermentation. Microanalytic equipment described includes colorimetric systems with vertical and horizontal liquid columns, a capillary microcolorimeter, semimicrocuvettes, a microfluorometer, and a microburette. Transl. by K.P.D.

N75-11588 Nauka Press, Moscow (USSR).
METABOLISM AND KIDNEY FUNCTION DURING SPACE FLIGHT, PART 2 [OBMEN VESHCHESTV I FUNKTSIYA POCHEK BO VREMYA POLETA V KOSMOSE, CHAST 2]
In its Probl. of Space Biol., Vol. 22 1973 p 89-194 refs In RUSSIAN

Matter exchange and kidney function during space flight are considered. Among the topics discussed are dehydration as a reason for weight loss, salt extraction, possible mechanisms of water-salt exchange, state of nitrogen exchange in flight and simulation studies, changes in general hemoglobin volume in the organism, use of anabolic steroids in equalizing possible disruption of exchange processes, non-esterified fatty acids in the blood, blood cholesterol, changes in the functions of the endocrine system, and skin tissue processes. Transl. by K.P.D.

N75-11589 Nauka Press, Moscow (USSR).
MECHANISM OF WATER ABSORPTION IN CERTAIN OSMOREGULATORY ORGANS, PART 3 [O MEKHANIZME VSASYVANIYA VODY V NEKOTORYKH OSMOREGULIRUYUSHCHIKH ORGANAKH, CHAST 3]
In its Probl. of Space Biol., Vol. 22 1973 p 195-209 refs In RUSSIAN

The mechanism of water absorption in several osmoregulatory organs is considered. The theory of osmotic transfer of liquids through a semitransparent membrane is reviewed. Permeability studies were conducted on frog bladders in water, and the transfer mechanism of water through the bladder wall. Transl. by K.P.D.

N75-11590*# Naval Biomedical Research Lab., Oakland, Calif.
STUDIES ON PROPAGATION OF MICROBES IN THE AIRBORNE STATE Quarterly Report, 1974 - 1975
R. L. Dimmick, H. Wolochow, Patricia Straat, and M. A. Chatigny [1974] 16 p
(NASA Order W-13450)
(NASA-CR-131844; QR-3) Avail: NTIS HC $3.25 CSCL 06M

An investigation was conducted to demonstrate whether airborne microbes could propagate. The procedure consisted of: (1) looking for dilution of a labelled base in DNA; (2) looking for labelling of DNA by mixing aerosols of the label and the cells; (3) examining changes in cell size; (4) testing the possibility of spore germination; and (5) seeking evidence of an increase in cell number. Results indicate that growth and propagation can occur under special conditions, principally at temperatures of approximately 30 C (87 F) and water activity equivalents of 0.95 to 0.98. Author

N75-11591*# North Dakota State Univ., Fargo. Dept. of Polymers and Coatings.
SOLUBILIZATION AND SPORE RECOVERY FROM SILICONE POLYMERS Ph.D. Thesis
Yu-Chuan Hsiao Jun. 1974 145 p refs
(Grant NGR-35-001-012)
(NASA-CR-140769) Avail: NTIS HC $5.75 CSCL 06M

A non-sporicidal technique for solvent degradation of cured silicone polymers was developed which involves chemical degradation of cured silicone polymers by amine solvents at room temperature. Substantial improvements were obtained in the recovery of seeded spores from room temperature cured polymers as compared to the standard recovery procedures, which indicates that the curing process is not sufficiently exothermic to reduce spore viability. The dissolution reaction of cured silicone polymers whith amine solvents is proposed to occur by bimolecular nucleophilic displacement. The chemical structure of silicone polymers was determined by spectroscopic methods. The phenyl to methyl ratio, R/Si ratio, molecular weight, and hydroxyl content of the silicone resins were determined. Author

N75-11592*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
TECHNIQUES OF BIOLOGICAL CONTAMINATION AVOIDANCE BY ATMOSPHERIC PROBES
R. E. DeFrees Aug. 1974 76 p refs
(Contract NAS2-7328)
(NASA-CR-137582) Avail: NTIS HC $4.75 CSCL 06M

The likelihood of biologically contaminating a planet by an atmospheric probe has a low probability of occurring if the probe is kept biologically clean during terrestrial operations and if the structure remains in tact until the planets life zone is completely penetrated. High standards of cleanliness, monitoring and estimating for remedial actions must be maintained in a probe program. It is not a foregone conclusion, however, that heat sterilization needs to be employed. The use of several techniques having a good potential for lower probe costs are available and appear adequate to render a probe sterile within acceptable bounds. The techniques considered to be satisfactory for minimizing microbial load include: (1) combined heat (at 95-105 C) and gamma radiation; (2) short term heating at 105 + or - 5 C to inactivate all vegetative microbes; (3) irradiation routinely by ultraviolet light; (4) wiping by a bactericidal agent with or without a penetrant; and (5) cleanliness alone. Author

N75-11593*# Scientific Translation Service, Santa Barbara, Calif.
ABSORPTION OF EXOGENIC COENZYMES BY MITOCHONDRIAL STRUCTURES UNDER NORMAL CONDITIONS AND UNDER GRAVITATIONAL OVERLOAD
V. N. Totskiy, Ts. Namsray, and V. A. Olshanetskaya Washington NASA 29 Nov. 1974 13 p refs Transl. into ENGLISH from Vop. Med. Khim., (USSR), v. 20, no. 5, Sep. - Oct. 1974 p 463-467
(Contract NASw-2483)
(NASA-TT-F-16011) Avail: NTIS HC $3.25 CSCL 06C

Rat liver mitochondria, preincubated for 5 minutes at 30 C, absorbed well nicotinamide (NMN, NAD) and flavine (FMN, FAD) coenzymes from the media of incubation. Isolated outer and inner membranes of the organelles bound significantly lower amounts of NAD than the whole mitochondria; the structural proteins of the organelles practically exhibited no interaction with the coenzyme. After gravitational loading applied to animals, the capacity of mitochondria to absorb exogenic coenzymes was distinctly increased. This phenomenon was due to an increased permeability of mitochondrial membranes. In this case, the organelles associated not only with NMN, NAD, FMN, and FAD, but also with NADP, which did not penetrate mitochondria under normal conditions. Author

N75-11594*# Scientific Translation Service, Santa Barbara, Calif.
STUDIES ON THE PURIFICATION AND CHARACTERIZATION OF DIPEPTIDYLAMINOPEPTIDASE, 4
A. Barth, H. Schulz, and K. Neubert Washington NASA Nov. 1974 30 p refs Transl. into ENGLISH from Acta Biol. Med. Ger. (East Germany), v. 32, 1974 p 157-174
(Contract NASw-2483)
(NASA-TT-F-16017) Avail: NTIS HC $3.75 CSCL 06C

In the microsomal of pig kidneys, aside from particle-bound aminopeptidase (EC 3.4.1.2), a dipeptidyl aminopeptidase is

observed which, upon solubilization, fractionated ammonium sulfate precipitation and column chromatography, can be separated from the aminopeptidase, and isolated purely by disc electrophoresis. It is assumed *that dipeptidyl aminopeptidase IV possesses* two different specifities for substrates with the sequence L-AS-L Ala-R, and for substrates with the sequence L-AS-L-Pro-R. The enzymatic hydrolysis of the two substrate sequences differs by the position of the optima and the inhibition by DFP. Whereas cations have a relatively weak influence on the enzymatic *activity of dipeptidyl aminopeptidase IV, the influence of anions* proved to be significant. Author

N75-11595# Wisconsin Univ., Madison. Dept. of Zoology.
ENERGY BUDGETS OF ANIMALS: BEHAVIORAL AND ECOLOGICAL IMPLICATIONS
May 1974 37 p refs
(Contract AT(11-1)-2270)
(COO-2270-2) Avail: NTIS HC $3.75

Energy balance equations for microclimates and animals were used to predict activity times, food requirements, and potential predator-prey interactions. Preliminary analyses of a simple predator-prey system had raised many more questions than it has answered. The model has pointed to a lack of vital information in the literature on digestive efficiences, growth rates in the field, biomass requirements for reproduction, and biomass requirements for early growth to maturity. Physiological measurements on a variety of active *endotherm predators are also* absent. Author

N75-11596# Joint Publications Research Service, Arlington, Va.
SOME RESULTS AND PROSPECTS FOR THE USE OF UNDERWATER HABITATS IN MARINE INVESTIGATIONS
V. G. Azhazha, ed. 23 Oct. 1974 154 p refs Transl. into ENGLISH of the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 1-148
(JPRS-63261) Avail: NTIS HC $6.25

Aspects of the uses of underwater habitats, including the medical and physiological factors which involve participating personnel, are described in terms of data resulting from prolonged stays by investigators in undersea laboratories.

N75-11597 Joint Publications Research Service, Arlington, Va.
CONDITION AND WORK CAPABILITY OF MAN UNDER INCREASED PRESSURES AND OPTIMAL COMPOSITIONS OF GAS MEDIUM
G. L. Zaltsman *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 1-14 refs Transl. into ENGLISH from the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 3-14

The initial narcotic effect of increased pressure of nitrogen in air on the human organism is described, along with the incipient narcotic effect of increased helium pressures; both effects constitute the overall physiological effect of increased pressures in a gaseous medium. The various types of hyperbaric narcosis are reported based on data acquired from the investigation of higher nervous activity in human subjects. An optimal condition is described whereby the composition of the gaseous medium is suitable for prolonged exposure to increased environmental pressure, as in underwater habitats. A.A.D.

N75-11598 Joint Publications Research Service, Arlington, Va.
FEATURES IN PROCESSES OF SATURATION (DESATURATION) AND OVERSATURATION OF AN ORGANISM AND PRINCIPLE OF ESTIMATING THE DECOMPRESSION REGIMES DURING EXTENDED STAY UNDER PRESSURE
G. L. Zaltsman *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 15-24 refs Transl. into ENGLISH from the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 15-23

N75-11599 Joint Publications Research Service, Arlington, Va.
NARCOTIC EFFECT OF INCREASED NITROGEN AND HELIUM PRESSURES (BASED ON RESULTS FROM EXPERIMENTAL RESEARCH CONDUCTED ON ANIMALS) **c51**
V. P. Ponomarev and A. I. Selivra *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 25-29 refs Transl. into ENGLISH of the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 24-27

Experimental data obtained from animals with electrodes chronically implanted in the brain are discussed in terms of the narcotic effect of nitrogen and helium (incipient manifestations) during increase in pressure to 400 gage atmospheres. The presence of variations in the brain's electrical activity in the absence of visible modifications of behavior in the initial period of the narcotic influence exerted by neutral gases is stressed. Author

N75-11600 Joint Publications Research Service, Arlington, Va.
PHYSIOLOGICAL DESCRIPTION OF DECOMPRESSION PHENOMENA
P. M. Gramenitskiy *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 30-36 refs Transl. into ENGLISH from the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 27-34

The aeroembolic process is described which develops in an organism as a result of transformation of a dissolved neutral gas to a free state after a reduction in external pressure. The appearance of emboli triggers a definite reaction of the cardiovascular and respiratory systems; such a reaction is considered protective. The inadequacy of this reaction evokes the appearance of the symptoms of decompression sickness. Author

N75-11601 Joint Publications Research Service, Arlington, Va.
TOLERABLE OXYGEN CONCENTRATIONS IN BREATHING MIXTURES DURING PROLONGED EXPOSURE
A. G. Zhironkin *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 37-45 refs Transl. into ENGLISH of the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 34-41

Tests were conducted on mice and monkeys in order to study the effect of various concentrations of oxygen in the air, under normal atmospheric pressure and under conditions of an extended stay (10 to 40 days). The results of the investigations revealed that a prolonged existence is possible in mediums containing up to 60 percent oxygen. Author

N75-11602 Joint Publications Research Service, Arlington, Va.
MEDICAL-PHYSIOLOGICAL OBSERVATIONS DURING CONDUCT OF SADKO-2 TEST
Ye. A. Korotayev, V. N. Kuzhelko, and A. I. Starshinov *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 46-63 Transl. into ENGLISH from the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov V Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 41-58

Medical support for the Sadko-2 experiment conducted in 1967 in the Black Sea is discussed, along with a detailed description of the organization and conduct of the experiment

itself. Recruitment of aquanauts for the project is described, and the results of preliminary biomedical investigations of the effect of prolonged exposure to underwater pressures. Author

N75-11603 Joint Publications Research Service, Arlington, Va.
MEDICAL-PHYSIOLOGICAL STUDIES IN THE IKHTIANDR-67 EXPERIMENT
E. A. Akhlamov, M. L. Barats, N. V. Vaynshteyn, S. A. Gulyar, S. A. Danilchenko, Yu. N. Kiklevich, A. M. Fedorchenko, and A. B. Khabs *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 64-71 Transl. into ENGLISH from the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 58-66

Research techniques are described, along with the basic data obtained during a study of the organism's physiological functions and adaptation requirements under extreme conditions. The research findings show that the changes in the basic functions of an organism under the conditions created by the Ikhtiandr-67 laboratory are slight and do not exceed the limits of compensatory capacities. Stays in underwater habitats of up to 7 days is quite tolerable and has no adverse effect on the health of the aquanauts. Author

N75-11605 Joint Publications Research Service, Arlington, Va.
CERTAIN OCEANOGRAPHIC TESTS WITH APPLICATION OF UNDERWATER HOUSE-LABORATORY SPRUT
L. Ye. Ayvazova, A. B. Korolev, V. B. Muravyev, M. V. Fedosov, and V. N. Shabalin *In its* Some Results and Prospects for the Use of Underwater Habitats in Marine Investigations (JPRS-63261) 23 Oct. 1974 p 86-89 refs Transl. into ENGLISH from the book "Nekotoryye Rezultaty i Perspektivy Primeneniya Podvodnykh Domov v Morskikh Issledovaniyakh" Moscow, Izdatelstvo Nauka Press, 18 Jun. 1973 p 78-83

One of the missions in the Sprut expedition involved a study of the possibility of oceanographic research in an underwater house-laboratory. Results of determining the pH and alkalinity proved comparable both in the underwater and shore-based laboratories. The results of determining the content of dissolved oxygen in the underwater laboratory proved to be 1 ml/l lower than in the shore-based laboratory. Author

N75-11615*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SELF-VAPOR COOLED TARGETS FOR PRODUCTION OF I-123 AT HIGH CURRENT ACCELERATORS
James W. Blue, Kenneth L. Scholz (Cincinnati General Hospital), and Vincent J. Sodd (Cincinnati General Hospital) 1974 15 p refs Presented at the Central Chapter Meeting of the Soc. of Nucl. Med., Minneapolis, 17-19 Oct. 1974
(NASA-TM-X-71620; E-8141) Avail: NTIS HC $3.25 CSCL 06E

The basic elements of the vapor cooled target system are shown. This system can be operated as a heat pipe or as a conventional condenser. The choice of target fluid is based on the specific nuclear reaction chosen to produce Xe-123. The reaction using I-127 was studied and shown to have a significant yield for bombarding energies from 47 to 63 MeV. The Cs-133 reaction is also included. Xenon-123 is applied to I-123 production in a purer form for thyroid studies. J.A.M.

N75-11616*# Linguistic Systems, Inc., Cambridge, Mass.
CARDIOPULMONARY EFFICIENCY IN FORMER AND ACTIVE CHAMPION SCULLERS
F. Dorschner and A. A. Buehlmann Washington NASA Nov. 1974 19 p refs Transl. into ENGLISH from Schweiz. Med. Wochensch. (Switzerland), v. 130, 1973 p 501-508
(Contract NASw-2482)
(NASA-TT-F-15728) Avail: NTIS HC $3.25 CSCL 06P

Cardiopulmonary efficiency was determined in 12 active and 12 former championship scullers grouped according to age, and the results were compared. None of the older subjects had any severe systemic diseases, especially of the lungs or the heart. Circulating blood volume, hemoglobin concentration, hematocrit, arterial blood pressure, alveolo-arterial Po2 gradient, arterial blood gases and lactate concentration were determined at rest, during submaximal work load on a bicycle ergometer and again after recovery. Total and vital capacities were higher than the predicted values, i.e., the residula volume increases with age. Resting blood pressure, resting blood gases, hematocrit and the other above-mentioned, simultaneously performed determinations yielded largely normal results. The 12 active athletes have a significantly higher working capacity and blood volume than the former champions. The cardiopulmonary efficiency of the formerly active group is remarkably higher in relation to the normal population as a result of continual cardiovascular training after retiring from the active sport. Author

N75-11617*# Scientific Translation Service, Santa Barbara, Calif.
HYPERBARIC OXYGENATION
I. P. Berezin Washington NASA Nov. 1974 181 p refs Transl. into ENGLISH of the book "Giperbaricheskaya Oksigenatsiya" Moscow, Meditsina Press, 1974 p 1-128
(Contract NASw-2483)
(NASA-TT-F-15988) Avail: NTIS HC $7.00 CSCL 06P

The characteristics and possibilities of hyperbaric oxygenation were studied. The effect of hyperoxygenation of the organism under various conditions was examined, and periods of same exclusion of circulation when breathing oxygen under increased pressure were measured. Problems of biological and technical safety during the conduct of hyperbaric oxygenation are described. Author

N75-11618# Department of Health, Education, and Welfare, Washington, D.C.
INTERNATIONAL CONFERENCE ON BONE MINERAL MEASUREMENT
Richard B. Mazess, ed. [1974] 416 p refs Conf. held at Chicago, 12-13 Oct. 1973
(DHEW(NIH)-75-683) Avail: NTIS HC $10.50

Photon absorptiometry, Compton scattering, and neutron activation methods for clinical and biomedical bone density measurements are reported.

N75-11619 Harvard Medical School, Boston, Mass. Dept. of Radiology.
PHYSICAL ASPECTS OF I-125 BONE ABSORPTIOMETRY
Philip F. Judy *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 1-10 refs

The accuracy of bone mineral absorptiometry using the radionuclide, I-125, as the photon source was found to be determined by hardening the photon beam and variation in the distribution of adipose tissue in the body. The hardening error was estimated to be + or - 2% when the system was calibrated over the biological range of bone mineral mass. The variations of adipose tissue thickness inside the bone and subcutaneously have been shown to depend critically on the method of determining the baseline. The errors caused by the detection of scattered radiation and the finite size of the photon beam have been shown to be less than 1% for a system calibrated by an ash study. Author

N75-11620 Alberta Univ., Edmonton. Div. of Biomedical Engineering.
UNIVERSITY OF ALBERTA BONE MINERAL ANALYSIS SYSTEM: PERFORMANCE AND CLINICAL APPLICATION
T. R. Overton, D. S. Silverberg, W. M. Rigal, and L. Friedenberg *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 11-29 refs

A system for bone mineral content (BMC) measurements using the Cameron photon absorption technique and Am-241 has been developed. This precision scanning device is readily adapted to make measurements at several body sites including the metacarpals, radius, femur and vertebrae. Provision is made for single and for multiple source mounting, and two channels

of pulse height analysis and recording are available, permitting the use of both single and dual photon measurement techniques. The studies described concern measurements of bone phantoms and of the femur using an Am-241 photon source.
Author

N75-11621 Zurich Univ. (Switzerland). Inst. fuer Biomedizinische Technik.
A METHOD FOR THE DETERMINATION OF THE COMPACTA AREA AND THE MEAN ABSORPTION DENSITY OF HUMAN BONES
P. Ruegsegger, P. Niederer, and M. Anliker *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 30-33 refs

It is possible to determine the bone mineral content to an accuracy of a few percent from noninvasive absorption measurements of soft gamma rays. Extensions of this technique demonstrated that size and shape of the compacta as well as its mean absorption density may also be evaluated in addition to the total mineral content. This is accomplished by repeating the linear scanning process at a given cross-section of the bone thirteen times by rotating the collimated beam of gamma rays through 15 deg after each scan. The range of the linear scan is divided into N = 1000 equal intervals. For scan direction n and interval k the mean pathlength of the gamma beam through the bone section is determined and the corresponding transmission rate of photons is denoted and stored in a computer for further processing.
Author

N75-11622 Washington Univ. Hospital, Seattle.
PRELIMINARY REPORT: CORRELATION OF TOTAL BODY CALCIUM (BONE MASS), AS DETERMINED BY NEUTRON ACTIVATION ANALYSIS WITH REGIONAL BONE MASS AS DETERMINED BY PHOTON ABSORPTION
Charles H. Chestnut, III, Eberhard Manske, David Baylink, and Wil B. Nelp *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 34-38 refs
(Contract AT(45-1)-2225; Grants AM-9096; MT-69-20-68; AM-53150-02)

Total body neutron activation analysis (NAA) allows accurate determination of total body calcium (TBC) and precise measurement of calcium balance. A unique measurement of total bone mineral mass is thereby obtained. Measurement of regional bone mass (RBM) by photon absorption using a bone densitometer is relatively rapid, simple and utilizes equipment commercially available. Both techniques provide important and significant data in assessing bone wasting disease and disease therapy. Measurements of RBM at six sites along the radius, ulna and humerus, are compared to TBC; in this way the relative efficacies and correlations of the two techniques are obtained. Results show that TBC in grams can be predicted from bone mass measurements obtained at the radial site; the standard error of estimate for TBC on RBM is 31.81 grams, a 12.4% relative error when calculated from the TBC mean.
Author

N75-11623 Brookhaven National Lab., Upton, N.Y. Medical Research Center.
CORRELATION OF RADIAL BONE MINERAL CONTENT WITH TOTAL-BODY CALCIUM IN VARIOUS METABOLIC DISORDERS
S. H. Cohn, K. J. Ellis, I. Zanzi, J. M. Letteri, and J. Aloia *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 39-50 refs Sponsored in part by AEC

Loss of bone mineral content of the skeleton in osteoporosis and in other metabolic disorders can be measured directly by total body neutron activation analysis (TBNAA). The densitometric technique (using monochromatic photons from I-125 applied to the appendicular skeleton) also reflects the loss of bone mineral in osteoporosis. The results of these two techniques are compared in 80 patients with various metabolic disorders and in 9 normal contrast subjects. It is apparent that there is good correlation between total body calcium (TBCa) and bone mineral content (BMC) in all groups studied. The correlation was highest in the normal contrast group (0.97) and alcoholics (0.98) and lowest in osteoporotic patients (0.83) and in renal patients on dialysis (0.84).
Author

N76-11624* Wisconsin Univ. Hospital, Madison. Dept. of Radiology (Medical Physics).
PREDICTION OF FEMORAL NECK AND SPINE BONE MINERAL CONTENT FROM THE BMC OF THE RADIUS OR ULNA AND THE RELATIONSHIP BETWEEN BONE STRENGTH AND BMC
Charles R. Wilson *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 51-59 refs

(Grant NGR-50-002-051; Contract AT(11-1)-1422)
CSCL 06P

The bone mineral content (BMC) is extensively used to provide information about the status of an entire skeleton. Changes in BMC are employed to evaluate the effect of various drugs, disease states, weightlessness, exercise, renal dialysis and others on the skeleton. Clinical and functional information is discussed that may be derived from the BMC of a limited region of the skeleton. In particular there is a fairly high degree of correlation between the BMC of the radius or ulna and that of the femoral neck, r about 0.85 and a somewhat lower relationship between the BMC of the radius or ulna and the thoracic vertebrae, r about 0.65. Also the BMC is highly related to the strength of bone at that scan site.
Author

N75-11625 Karolinska Institutet, Stockholm (Sweden). Dept. of Medical Engineering.
BONE MINERAL ASSAY: CHOICE OF MEASURING SITES
Nils Dalen *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 60-65 refs

Data are collected by the X-ray spectrophotometric method on the bone mineral content at various sites during different clinical conditions, such as alcoholics, patients with primary hyperparathyroidism, patients with chronic renal failure, non-patients and athletes. The sites were radius and ulna distal and shaft, head of humerus, third lumbar vertebra, femur neck and shaft, and calcaneus. The correlation between different sites in the same individual is weak, and the bone mineral content at the different sites deviates relative to controls in a varying way. Therefore, several sites should be measured to avoid erroneous conclusions.
Author

N75-11626 Wisconsin Univ. Hospital, Madison. Dept. of Radiology (Medical Physics).
DIRECT READOUT OF BONE MINERAL CONTENT WITH DICHROMATIC ABSORPTIOMETRY
W. C. Kan, C. R. Wilson, R. M. Witt, and R. B. Mazess *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 66-72 refs

An analog device has been constructed which provides immediate readout of bone mineral content and bone width from absorptiometric scans with two photon beams with different energies such as Gd-153 or I-125/Am-241. The system and preliminary results are presented.
Author

N75-11627 Wisconsin Univ. Hospital, Madison. Dept. of Radiology (Medical Physics).
ANALYSIS OF Gd-153 AND OF I-125/Am-241 SOURCES
James Hanson *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 73-79 refs

The precision of the dual photon bone mineral technique was modeled mathematically as an expression based on counting statistics. For a given amount of bone and soft tissue there is an optimal photon energy pair. When the initial intensities of the photon beams are equal, the optimal lower photon energy increases with increasing mass of bone and soft tissue for a given higher photon energy. Dual sources of interest are I-125/Am-241 (28 and 60 keV) and Gd-153 (43 and 100 keV). The bone mineral measured in thin anatomical locations (i.e. hand and forearm) with I-125/Am-241 is more precise than with Gd-153. For thick locations (i.e. upper arm and calf) Gd-153 is more precise than I-125/Am-241.
Author

N75-11628 Siemens A. G., Erlangen (West Germany).
DUAL PHOTON X-RAY BEAM APPLICATIONS
K. H. Reiss, K. Killig (Erlangen Univ.), and W. Schuster (Erlangen Univ.) *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 80-87 refs

Two X-ray spectra of different penetration are obtained by switching a normal X-ray generator 5 times a second by means of thyristors. The tube voltage is alternating between about 60 to 90 kV and 150 kV. The higher energy radiation is filtered by an oscillating copper filter of variable thickness so that the intensities of both spectra behind the body are approximately the same. They are measured in a narrow beam by a photomultiplier behind an image intensifier. The quotient of the two intensities delivers a figure for the bone mineral in g/sq cm. Results with excised bones and with patients are presented. Author

N75-11629 Sloan-Kettering Inst. for Cancer Research, New York. Biophysics Lab.
DUAL ENERGY ABSORPTIOMETRY TECHNIQUE FOR BONE MINERAL CONTENT MEASUREMENT
Joseph M. McDonald and Louis Zeitz *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 88-99 refs

(Contracts AT(11-1)-3521; CA-08748)

A dichromatic, or dual energy photon, technique has been developed for the in vivo determination of the mineral content of human bones, in particular the radius and ulna. A dichromatic system, with artificial bone standards and paraffin (simulating fat) in plexiglass, corrected for the presence of the fat component. Corrected integral values had standard deviations from the true values of up to a few percent, while the precision of the technique was approximately two percent for these measurements. Author

N75-11630 Aktiebolaget Atomenergi, Nykoping (Sweden).
BONE MINERAL MEASUREMENTS USING A DICHROMATIC ATTENUATION TECHNIQUE WITH SIMULTANEOUS OPERATION IN TWO ENERGY CHANNELS
Per Schmeling *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 100-107 refs

In vivo measurements of bone mineral using a single gamma energy require the use of water or other issue equivalent substances. The dichromatic technique makes measurements in air possible, as the use of two gamma energies eliminates the influence of soft tissue. Simultaneous operation in two channels with automatic and continuous elimination of soft tissue was demonstrated. The primary results could be obtained directly on a recorder. It was easily possible to measure radius, ulna, humerus, femur, tibia, fibula, and patella. Even the cranium and the spine could be registered. The isotope used was Xe-133, but the results should be applicable to Gd-153 and other isotopes with energies below 100 keV. Author

N75-11631 Mineralogisch-Petrologisches Inst., Bonn (West Germany).
A NEW APPARATUS FOR BONE MINERAL MEASUREMENT IN VIVO
M. Gebhardt and H. Zwicker *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 108-113 refs

An apparatus was constructed which permits absorption measurements on the finger. A finger holder keeps the middle phalanx of the finger in an exact fixable position, whereby the soft tissue parts are slightly pressed between two parallel plexiglass windows. The total width of the finger can be measured with the help of a gauge having a calibration of 0.01 mm. The bone thickness is determined by a film photograph, whereby the measuring space is kept fixed. Absorption measurements are done with highly stablized X-ray tubes and monochromators rather than radionuclides. Author

N75-11632 Wisconsin Univ. Hospital, Madison. Dept. of Radiology (Medical Physics).
BONE STANDARDS FOR THE INTERCOMPARISON AND CALIBRATION OF PHOTON ABSORPTIOMETRIC BONE MINERAL MEASURING SYSTEMS
Robert M. Witt *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 114-122 refs

Bone standards have been constructed to provide for the intercomparison and calibration of photon absorptiometric bone measuring systems. The standards are composed of polymethyl methacrylate blocks with three annular cavities which are filled with a saturated solution of dipotassium hydrogen phosphate (KHP). The saturated KHP solution has linear attenuation properties similar to those of compact bone. The dimensions of the inner and outer diameters of the annular cavities are similar to the dimensions of the midshafts of radii and metacarpals. The bone mineral content (BMC) of these standards was calibrated by ash bone sections in units of g/cm of bone ash. Author

N75-11633 Harvard Medical School, Boston, Mass. Dept. of Radiology.
ORGANIZATION AND PROCESSING OF BONE MINERAL DATA USING A GENERAL PURPOSE STORAGE AND RETRIEVAL PROGRAM AND A MINICOMPUTER
R. E. Zimmerman, T. Daily, R. Snider, and H. J. Griffiths *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 123-129 refs

The measurement of bone mineral content utilizing the photon absorption method has become routine in a number of major medical centers. An information storage and retrieval program operating on a minicomputer has been used to aid in processing data from over 1780 scans on 985 patients. The program is described along with the human factors involved, source documents, accuracy, reliability and methods of coordinating the data. Author

N75-11634* California Univ., Davis. Dept. of Radiology.
BONE MINERAL COMPUTATION WITH A RECTILINEAR SCANNER
John Ullman, Scott Brown, Alan Silverstein, and John Vogel *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 130-141 refs
(NASA Order T-93591; NASA Order T-81073)
CSCL 06B

A portable rectilinear transmission scanner and associated computerized data reduction techniques for estimating bone mineral content are described. This unit can be easily disassembled for transport to various measurement sites and has been used to estimate the bone mineral content of the os calcis, radius, and ulna in the Apollo and Skylab astronauts. The scanner is used to obtain multiple rows of data from which a bone profile is derived. Bone edges are determined with the aid of a digital computer program which employs an algorithm that determines the greatest rate of change of the counting rate. Author

N75-11635 Freie Univ., Berlin (West Germany).
A COMPUTERIZED METHOD OF DETERMINATION OF BONE MINERAL CONTENT BY A TRANSMISSION-SCANNER: DESCRIPTION OF THE SYSTEM
Udo Schneider and Dietrich Banzer *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 142-150

Based on the method of Cameron and Sorenson a transmission scanner has been developed including a movable X-ray tube. Additional information about geometry and structure of the bone which has been examined is obtained by several radiographs in the plane of measurement. The data is evaluated by a computer and is stored on magnetic tape, together with clinical information. Automatic reports for the physician are printed and scientific evaluation is possible by several programs. With special equipment the bones of small animals are measured. Most of the human measurements were done on the calcaneus. Normal ranges for this bone were evaluated. Author

N75-11636 Harvard Univ., Cambridge, Mass. Cyclotron Lab.
IN VIVO CALCIUM DETERMINATION BY PROTON ACTIVATION ANALYSIS
Richard Eilbert *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 151-154
(Grant NSF GI-38443)

Proton activation of Ca-40 in bone produces K-38. This radionuclide undergoes beta decay, emitting a 2.17 MeV gamma ray with a half life of 7.7 minutes. Knowledge of the proton flux and efficient detection of the subsequent gamma radiation allow a precise determination of calcium in vivo. Localization of dose is made possible by the finite range of protons and their resistance to scattering sideways because of their heavy mass. Collimators can be constructed to restrict the field of irradiation to any desired shape in the transverse plane. Proton flux is determined from a monitor ionization chamber placed upstream from the final collimator. By using pre-absorbers, any proton energy less than 160 MeV can be attained at the skin. Tissue dose is correspondingly limited to any desired penetration depth less than 18 cm. Author

N75-11637 Edsel B. Ford Inst. for Medical Research, Detroit, Mich. Physics and Biophysics Dept.
AN EVALUATION OF SEVERAL NUCLIDES FOR BONE DENSITY DETERMINATIONS BY COMPTON SCATTERING
Dennis G. Piper, Luther E. Preuss, and Frank P. Bolin *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 155-160 refs

The isotopes available for use in the Compton scattering method of determining bone density are considered. System performance for this technique is optimum at an energy of about 90 keV, dropping off by a factor of two at about 200 keV. In accordance with this conclusion, only those isotopes with gamma energies of 80 to 200 keV are investigated. Some of the isotopes had several emissions which would interfere with the desired energy, or were too expensive to produce. The nuclides studied were Ba-133, Tm-170, Cd-109, Eu-155, Gd-153, Ag-108, Co-57, Se-75, Ce-144, Ce-139, Sb-125, and Ho-166. Author

N75-11638 Erlangen-Nuremberg Univ. (West Germany).
CORRELATION OF OS CALCIS AND SPINAL BONE BY COMPTON SCATTERING
Robert Luther *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 161-168 refs

The mineral contents of 50 os calcis and 50 spines have been measured simultaneously using the Compton scattering method. The results were established statistically. Investigations in vitro showed that the mineral is so inhomogeneously distributed in the os calcis that a single measurement is not able to provide any information about the average hydroxyapatite (HA) precentage of this bone. The investigations into the HA-precentage of the spine revealed a statistically significant negative correlation with age. Comparative investigations on the HA-percentage of os calcis and spine showed that although calcar bone contains much spongiosa there was not a significant correlation between the two. Author

N75-11639 Wright State Univ. Research Inst., Dayton, Ohio. Radiological Research Lab.
PROGRESS IN RADIOGRAPHIC PHOTODENSITOMETRY
Charles Colbert and Richard S. Bachtell *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 169-176

To determine the skeletal status of a patient and his response to therapy we obtain radiological estimates of bone weight, size, and density from a pair of radiographs and compare these with age-and sex-matched control values. The X-ray film image is scanned by a micro-densitometer connected on-line to a small computer which prints out a skeletal status report based on findings from two films of the same fingers. The second film, taken at kilovoltage and exposure settings different from the first, is used to confirm the findings. Author

N75-11640 Chicago Univ. Hospitals and Clinics, Ill. Dept. of Radiology.
SKELETAL DEMINERALIZATION IN PRIMARY HYPERPARATHYROIDISM
Harry K. Genant, Jean VanderHorst, Lawrence H. Lanzl, Jay C. Mall, and Kunio Doi *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 177-194 refs

Skeletal mineralization has been assessed in 87 patients with primary hyperparathyroidism. Qualitative studies included a review of conventional radiographs of the spine and hands, and an analysis of fine detail radiographs. Quantitative assessment included radiographic morphometry using the cortical thickness of the second metacarpal, and photon absorptiometry using the linear absorption coefficient of overall bone in the phalanx. The results indicate that: (1) radiographic osteopenia in primary hyperparathyroidism is uncommon and difficult to assess; (2) fine detail radiography demonstrates excessive bone resorption undetected on conventional radiographs; (3) quantitative analyses using metacarpal cortex and phalangeal mineral content reveal bone loss in a majority of hyperparathyroid patients. Author

N75-11641 Glostrup Hospital, (Denmark). Dept. of Clinical Physiology.
ANTICONVULSANT OSTEOMALACIA
Claus Christiansen and Paul Rodbro (Aalborg Sygehus Syd, Denmark) *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 198-205 refs

The bone mineral content related to total body calcium was estimated by photon absorptiometry in 226 epileptic patients on long term treatment with phenytoin, phenobarbitone or primidone, and in 20 normal subjects before and during treatment with vitamin D sub 2 or placebo. Initially subnormal values of bone mineral content were found in the epileptic patients. The group of epileptic patients showed on treatment with vitamin D sub 2 a significant increase in bone mineral content. The group of epileptic patients treated with placebo and the normal subjects treated with vitamin D sub 2 or placebo showed no change in bone mineral content. Author

N75-11642 Freie Univ., Berlin (West Germany). Klinikum Steglitz.
A COMPUTERIZED METHOD OF DETERMINATION OF BONE MINERAL CONTENT BY A TRANSMISSION SCANNER
Dietrich Banzer and Udo Schneider *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 206-213

Measurements on patients with chronic renal disease, including those on hemodialysis or post renal transplant, showed a bone mineral loss of up to 50%. The mineral content of the os calcis depends on the duration of the disease as seen in follow-up studies over two years. About 50 measurements on patients with disturbance of the ovarial function showed a significant demineralization and characteristic changes of bone density under therapy with estrogens. A decrease of bone mineral content was also seen in patients with hyperthyroidism, thyroidectomy, rheumatic diseases, vascular diseases, and fractures of the lower extremities. A post-operative follow-up study after parathyroidectomy demonstrates the prognostic value of the method in hyperparathyroidism. Author

N75-11643 University Hospital, Basel (Switzerland). Div. of Metabolism.
BONE MINERAL LOSS IN PRE-MENOPAUSE
K. R. Heer, A. Roesli, Th. Lauffenburger, J. Guncaga, M. A. Dambacher, and H. G. Haas *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 214-221 refs

The bone mineral content (BMC) in the pre-menopause was assessed by absorptiometry in 83 normal women aged 48 to 54 and 40 normal female subjects aged 38 to 44. A modification of the scanning procedure proved to be necessary in order to obtain reproducible results. Cortical BMC values of the right radius correlated with roentgenographic findings of the lumbar spine obtained by a standardized technique. No such correlation was found for the trabecular BMC values in the younger age group. The average cortical BMC was the same in both age groups, but bone mineral loss appears to be a nonuniform process. Some subjects may be more sensitive to a decreasing ovarian function in pre-menopause; they may lose bone mineral earlier and/or more rapidly. Author

N75-11644 Washington Hospital Center Washington, D.C. Dept. of Endocrinology.

A PRELIMINARY EVALUATION OF DIAGNOSIS AND THERAPY IN OSTEOPOROSIS

Jay R. Shapiro, W. Tabb Moore, Hildegard Jorgensen (Howard Univ., Washington, D. C.), Charles Epps (National Inst. of Arthritis, Metabolism, and Digestive Disease, Bethesda, Md.), Jeanne Reid (National Inst. of Arthritis, Metabolism, and Digestive Disease, Bethesda, Md.), and G. Donald Whedon *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 222-224 refs

(Grant RR-05361)

The Norland Bone Mineral Analyzer is evaluated in terms of its diagnostic accuracy in the patient with osteoporosis and a new therapeutic regimen in osteoporosis is discussed. The regimen involved the use of a 2400 milligram calcium, 2200 milligram phosphorus intake. In the later stages of this study, oral vitamin D sub 2 was added. Bone was scanned with the mineral analyzer at two sites: the proximal site was 8 centimeter cephalic to the head of the radius while the distal site was 3 centimeter cephalic to the head of the radius. Proximal-distal mineral content ratios for normals, hyperparathyroids, and osteoporotic patients showed a great degree of overlap for both sex and race groups. While greater loss of distal was seen in occasional patients, the use of this ratio did not serve to discriminate the osteoporotic patients from normals. Author

N75-11645 Mayo Clinic, Rochester, Minn. Dept. of Laboratory Medicine.

PHOTON ABSORPTION METHOD AND SINGH INDEX IN THE DETECTION OF OSTEOPOROSIS: A COMPARATIVE STUDY

H. W. Wahner, B. L. Riggs, and J. W. Beabout *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 225-227 refs

Compared are estimates on bone mineral content for the photon absorption method of Cameron and the skeletal grading method of Singh in their abilities to separate normal females over 45 from females of the same age but with compression fractures of the spine. There was no difference between the normal and the osteoporosis population by bone mineral determination with the Cameron method at the mid-radius. However, a significant separation between the two populations was seen at the distal scanning site. A significant overlap between the two populations, however, limits the usefulness of the procedure for routine clinical diagnosis. A better separation was achieved with the Singh index. Eighty-two percent of all normal subjects over 45 years had index values 5 or above. It is concluded that the evaluation of the trabecular structure of the femur better and perhaps earlier reflects spinal changes in osteoporosis, than the bone mineral determination by the Cameron method. Author

N75-11646* Wisconsin Univ. Hospital, Madison. Dept. of Radiology.

BONE MINERAL CONTENT IN NORMAL US WHITES

Richard B. Mazess and John R. Cameron *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 228-238 refs

(Grant NGR-50-002-051; Contract AT(11-1)-1422)
CSCL 06P

Photon absorptiometry with I-125 was used to measure the bone mineral content and the bone width on 763 children between the ages of 5 and 19 years, on 538 adults between the ages of 20 and 49 years, and on 550 adults over the age of 50 years. Measurements were made on the midshaft and the distal end of the radius and the ulna, and on the humerus midshaft. This has permitted analysis of annual bone growth in children, and the rate of change in elderly adults per decade. Male and female children grew at about the same rate until adolescence. After adolescence females grew at a slow rate until the mid-twenties, while males reached adult mineralization by age 20. Males remained relatively constant until the fifties, and females began their decline in the forties. Author

N75-11647 Goldsmith (N. F.), Reston, Va.

NORMATIVE DATA FROM THE OSTEOPOROSIS PREVALENCE SURVEY, OAKLAND, CALIFORNIA, 1969-1970, BONE MINERAL AT THE DISTAL RADIUS: VARIATION WITH AGE, SEX, SKIN COLOR, AND EXPOSURE TO ORAL CONTRACEPTIVES AND EXOGENOUS HORMONES; RELATION TO AORTIC CALCIFICATION, OSTEOPOROSIS, AND HEARING LOSS

N. F. Goldsmith *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 239-266 refs
(Grants PH-86-68-181; HS-00288)

The prevalence of osteoporosis was evaluated in 8,434 persons; A low degree of mineralization was found in lactators, women undergoing early menopause, and nonusers of hormones, and in association with fracture, aortic calcification, and vertebral osteoporosis. A high degree of mineralization was associated with bilateral hearing impairment in older men and was found in younger women after childbearing or the use of high mestranol contraceptives, in older women after treatment with sulfated estrogens, and in all women after treatment with all steroid hormones and thyroid. The major determinants of bone mineral at the distal radius were age, sex, parity, early menopause, skin color, exogenous hormone usage, and lactation. Author

N75-11648 Geneva Univ. (Switzerland). Div. of Nuclear Medicine.

INFLUENCE OF THE NATURAL CALCIUM AND FLUORIDE SUPPLY AND OF A CALCIUM SUPPLEMENTATION ON BONE MINERAL CONTENT OF HEALTHY POPULATION IN SWITZERLAND

A. Donath, P. Indermuehle, and R. Baud *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 267

The bone mineral content was measured of 3000 inhabitants of the city of Geneva and of people living in Swiss mountain villages where water is naturally fluoridated and contains about 10 mg F/liter. There was not any significant difference in bone mineral content. Author

N75-11649 Indiana Univ., Indianapolis. Dept. of Medicine.

MINERAL LOSS WITH AGING MEASURED PROSPECTIVELY BY THE PHOTON ABSORPTION TECHNIQUE

David M. Smith, M. R. A. Khairi, and C. Conrad Johnston, Jr. *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 268-276 refs
(Grant AM-07126)

Rates of loss of bone mass were estimated in a group of 27 post-menopausal females followed for 2.4 years. Measurements of bone mass were performed at midshaft and distal sites on the radius by the photon absorption technique. The rates of loss were -.0237 gm/cm/yr for the distal site and -.0117 gm/cm/yr for the midshaft sites. Rates predicted from a population survey of 214 aged matched Caucasian females approximated those observed in the prospective study. From these data estimates of size of treatment and control groups needed to demonstrate a reduction in the rates of loss were made. It is concluded that the photon absorption technique can be feasibly utilized to demonstrate drug effects on the age related loss of bone mass. Author

N75-11650 Hamburg Univ. (West Germany). Abteilung Klinische Osteologie.

BONE MINERAL DETERMINATION OF RADIUS, ULNA, AND FINGERBONES BY I-125 PHOTON ABSORPTIOMETRY ON HEALTHY PERSONS

F. Kuhlencordt, J. D. Ringe, H. P. Kruse, and A. V. Roth *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 277-281 refs

The Norland bone mineral analyzer was used on 140 healthy persons, i.e. 77 women and 63 men, in order to obtain normal values for our population. The site measured was at a point 1/3 the distance from the distal end of the radius. Also measured was the corresponding site of the ulna and across the middle of the basic phalanx of the second, third, and fourth finger. A small mineral loss between the 35th and 65th year of life was found; this loss was more important in women. Author

N75-11651* Minnesota Univ., St. Paul. College of Veterinary Medicine.
TIBIAL BONE MINERAL DISTRIBUTION AS INFLUENCED BY CALCIUM, PHOSPHORUS, AND VITAMIN D FEEDING LEVELS IN THE GROWING TURKEY
Francis A. Spurrell, Juan Brenes, and Paul Waibel *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 282-284
Sponsored in part by AEC
(Contract NAS2-7375)
CSCL 06C

Roentgen signs, subperiosteal, endosteal, and trabecular bone growth are evaluated in turkeys fed phosphorus at the 0.5, 0.56, 0.68, 0.90, and 2.70 percent levels. Calcium levels of 0.30, 0.40, 0.60, 1.2, and 3.60 percent were also tested. Vitamin D levels of 0, 100, 300, 900 and 27,000 I.U. per day were likewise evaluated. Roentgen signs, bone mineral as measured by T-125 gamma ray absorption, and bone mineral growth patterns as shown by radiograph area projection are correlated with calcium, phosphorus, and vitamin D feeding levels. Differences in bone growth at the various feeding levels were observed which were not reflected by differences in other studied parameters. Author

N75-11652 Veterans Administration Hospital, Sepulveda, Calif.
DIETARY CALCIUM AND THE JAW BONE
Leo Lutwak and Ann Coulston *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 285-292 refs

Previous work with animals demonstrated that periodontal disease with associated demineralization of the jaw was a precursor of generalized systemic osteoporosis. A pilot study in human subjects with periodontal disease confirmed an animal project which had demonstrated reversal of the clinical signs of this disorder by supplementation of the diet with calcium. In the present study 90 adult subjects with periodontal disease received either placebo or 1 gm calcium per day for 12 months. Densitometry of the os mentis showed a highly significant increase in bone density in the patients receiving calcium supplementation for 12 months. Author

N75-11653 Naval Medical Research Inst., Bethesda, Md. Tissue Bank Div.
TRANS-IMAGING OF BONE ALLOGRAFTS: A RAPID METHOD FOR EVALUATING OSSEOUS INCORPORATION
Robert W. Bright, Vincent L. McManaman (Armed Forces Radiobiology Research Inst., Bethesda, Md.), and Alfred M. Strash (Medical College of Virginia, Richmond) *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 293-301 refs

Quantitative evaluation of graft incorporation is required in order to assess and direct the post-operative care of a patient. Rectilinear scanning with Am-241 and high performance gamma camera were used to image the entire extremity area; maximum utilization of the grid was accomplished by focusing the source and bone specimen some distance from the camera. A computer was then repeatedly directed to bisect the image and to plot the multiple scans from the single image. Bone mineral content throughout the graft and surrounding host bone was then determined, and this data was stored for comparison with sequential scans. It is felt that this method can play an important clinical role in patient care as well as provide the researcher with a better tool for evaluating and selecting the best possible grafting material. Author

N75-11654 Argonne National Lab., Ill.
EFFECTS OF SKELETAL RADIUM DEPOSITS ON BONE MINERALIZATION
Robert A. Schlenker and Billie G. Oltman *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 302-316 refs

Measurements of bone mineralization are reported for 281 women over 40 who have abnormally high body burdens of radium. The measurements were made at the midshaft and distal end of the radius. No significant differences are found in the bone mineralization between women with body burdens less than 0.003 micron Ci and with body burdens between 0.003 and 0.1 micron Ci. The rate of demineralization in women over 60 who have body burdens greater than 0.1 micron Ci is twice as great as in women over 40 who also have body burdens but less than 0.1 micron Ci. The difference in rates of demineralization is statistically significant at the 95% level. Bilateral symmetry of mineralization is not significantly disturbed by skeletal radium deposits in right-handed women, when the body burden is less than 0.1 micron Ci. Author

N75-11655 Erlangen-Nuermberg Univ. Childrens Hospital (West Germany).
FOLLOW-UP EXAMINATION OF THE MINERAL SALT CONTENT IN THE SKELETON WITH VARIOUS VITAMIN D RESISTANT FORMS OF RICKETS OF RENAL ORIGIN
W. Schuster *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 317-324 refs

With the aid of experimental facilities specially developed for pediatric requirements, 7 patients with chronic phosphatic diabetes, 7 children with uremic osteodystrophy, 3 patients with the De Toni-Fanconi syndrome and 1 patient with distal tubular acidosis of the Albright type were examined during to determine the mineral salt content in peripheral parts of the skeleton. The results of the long-term follow-up reveal the different responses to the therapeutic measures so far possible, in the case of the various vitamin D-resistant forms of rickets of renal origin. In chronic phosphatic diabetes, even long term treatment fails to replenish the calcium deposits in bones to any noticeable extent. With the other diseases therapy brings about, are increase of the mineral salt concentration in the skeleton. Author

N75-11656 Leeds Univ. (England). Biological Research Unit.
CHANGES IN SKELETAL MINERAL IN PATIENTS WITH RENAL FAILURE
P. J. Atkinson, F. M. Parsons, G. W. Reed, and D. A. Hancock *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 325-336 refs

Bone measurements have been made at regular intervals over several years on 15 patients with renal failure, using a technique that employs the 60 keV emission of Am-241 scanned across the femoral shaft. Individual patients, show different degrees of bone mineral change. In some cases, vitamin D therapy not only prevented bone loss but also enhanced bone mineralization. Patients having bad bilateral nephrectomy showed a tendency to lose bone and this may perhaps have reflected a deficiency of 1,25 dihydroxycholecalciferol. Two transplanted patients, on the other hand, also showed a tendency to lose bone rapidly. Author

N75-11657 Harvard Medical School, Boston, Mass.
THE ROLE OF PHOTON ABSORPTIOMETRY IN THE DIAGNOSIS AND FOLLOW-UP OF PATIENTS WITH RENAL FAILURE
Harry J. Griffiths and Robert E. Zimmerman *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 337-345 refs

Using a I-125 photon absorption method to measure bone mineral, 800 measurements have been performed on the cortical bone of the lower arm in 382 patients with renal failure representing every stage of the disease. The following conclusions can be drawn from the data: (1) prolonged azotemia leads to severe loss of bone mineral which, in the early stages, is only detectable using photon absorptiometry; (2) there is inexorable loss of bone mineral while the patient is on dialysis; (3) parathyroidectomy may slow this loss of bone mineral but fails to correct the osteomalacia; (4) after transplantation the rate of bone loss will either decrease or cease. Author

N75-11658 Harvard Medical School, Boston, Mass. Dept. of Radiology.
THE CORRELATION OF RADIOGRAPHIC BONE SURVEYS WITH BONE MINERAL VALUES OBTAINED USING A PHOTON ABSORPTIOMETRIC TECHNIQUE IN A GROUP OF 315 PATIENTS WITH CHRONIC RENAL FAILURE: A PRELIMINARY REPORT
Harry J. Griffiths, R. E. Zimmerman, and G. Bailey *In* HEW

Intern. Conf. on Bone Mineral Meas. [1974] p 346-351

Radiographic and absorptiometric measurements were done on 315 patients at all stages of renal failure. Bone mineral was subnormal in 32% of the patients. Various components of renal osteodystrophy occurred in combinations, and were often associated with a decrease in the bone mineral content. Both radiographic and absorptiometric studies should be performed at three month intervals, if the patient has normal bone and more frequently if bone mineral starts to decrease. Author

N75-11659* California Univ., Davis. Dept. of Radiology.
BONE MINERAL CHANGES IN THE APOLLO ASTRONAUTS
John Max Vogel *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 352-361 refs
(NASA Order T-93591)
CSCL 06P

Loss of mineral from bone during periods of immobilization, recumbency or weightlessness have been observed. These losses are more apparent in the lower extremity than the upper and have been observed to exceed 30% in the case of the central os calcis during 36 weeks of bedrest. In early Gemini studies using X-ray densitometry, large losses of bone mineral were observed in the radius and ulna. This observation was not validated in the Apollo 14, 15 and 16 crewmen when a more precise technique, gamma ray absorptiometry, was used. The large losses reported for the early Gemini missions were not seen when this new measuring technique was employed. Author

N75-11660 Malmoe General Hospital (Sweden). Dept. of Orthopedic Surgery.
BONE MASS AND COLLE'S FRACTURE
Bo E. Nilsson and Nils E. Westlin *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 362-368

Epidemiological studies of Colle's fracture suggest a strong age dependence, particularly in women. Furthermore, a significant coincidence between Colle's fracture and femoral neck fracture has been demonstrated and it may be assumed that the former is an early and the latter a late sign of bone fragility. Even if, in the present study, there was a small difference in bone mass between fractured and un-fractured women, this difference was not significant on the fracture site. It might therefore be assumed that Colle's fracture is a symptom of decreased bone quality which occurs before any appreciable loss of bone mineral has taken place. Author

N75-11661 New York Univ. Medical Center. Dept. of Biochemical Pharmacology.
CHANGES IN BONE MINERALIZATION IN HEMIPLEGIA
C. H. Marshall, A. T. Viau, L. Berkovits, W. S. Davis, D. S. Chu, and N. E. Naftchi *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 369-379 refs

Hemiplegia is characterized by paralysis on one side of the body. In order to relate bone mineral changes to the effect of paralysis, the non-paralyzed side was used as a control for the paralyzed side. The bone mineral content was measured in 43 hemiplegic subjects matched for age and sex, using a modified Packard device with I-125 as the source. The bone density was compared bilaterally at two sites on radius and ulna, two and four centimeters from the wrist. The results at equivalent sites were expressed as the ratio between the absorption on the paralyzed and non-paralyzed sides. Regression analysis of the relationship between this ratio and time indicated that the rate of loss of mineral from the paralyzed side was 5% + or - 2.5% per 100 days. Author

N75-11662 Western Ontario Univ., London. Faculty of Physical Education.
BONE GROWTH AND PHYSICAL ACTIVITY IN YOUNG MALES
Ronald C. Watson *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 380-386 refs

Photon absorptiometry was utilized to probe the relationship between bone mineral content and the physical activity of amateur baseball players. The study focused principally upon the dominant non-dominant differences in mineral content within age groups and the changes in this variable over age. Upper and lower arm limb girths as well as grip strength were measured to validate physical stress dominance. The most consistent finding throughout the investigation was that the dominant humerus was significantly more mineralized for all age groups and the degree of dominance increased significantly with age. This characteristic held when the influence of bone size was accounted for by testing the mineral/width ratio. The patterns for mineral dominance of the radius and ulna were inconsistent. Author

N75-11663 Wayne State Univ., Detroit, Mich. School of Medicine.
THE EFFECT OF DIPHOSPHONATE THERAPY ON THE BONE LOSS OF IMMOBILIZATION
A. Robert Arnstein, Frank S. Blumenthal, John A. Bevan (Proctor and Gamble, Inc.), Scotte Michaels (Proctor and Gamble, Inc.), and Daisy S. McCann (Michigan Univ.) *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 387-396 refs

In this group of men with quadriplegia and paraplegia due to spinal cord trauma, 12 weeks of treatment with EHDP prevented a negative bone mineral balance in the distal tibial diaphysis as measured by I-125 photon absorption, but did not prevent apparent qualitative radiographic progression in the tibial metaphysis. In addition, high pre-treatment levels of serum iPTH were found in some of these patients and remain unexplained. They tended to increase with time and this increase was not related to treatment with EHDP or its associated hyperphosphatemia. Author

N75-11664 Wisconsin Univ., Madison. Dept. of Preventive Medicine.
THE EFFECTS OF PHYSICAL ACTIVITY ON BONE IN THE AGED
Everett L. Smith *In* HEW Intern. Conf. on Bone Mineral Meas. [1974] p 397-407 refs

The hypothesis that physical activity effectively slows the progress of bone loss and causes bone accretion in the aged was supported by the results of this study. Physical activity slowed the normal process of bone loss, as seen by bone mineral increases of the physical activity group (2.6%) and the physical therapy group (7.8%). When compared to the control group, the physical activity group, while demonstrating a positive increase, was not significant for the 8 month period of the study; the physical therapy group when compared to the control group was significant. Author

N75-11666*# Vermont Univ., Burlington. Dept. of Electrical Engineering.
PROCESSING ELECTROPHYSIOLOGICAL SIGNALS FOR THE MONITORING OF ALERTNESS Annual Report, 1 Oct. 1973 - 30 Sep. 1974
David C. Lai Nov. 1974 39 p refs
(Grant NGR-46-001-041)
(NASA-CR-140815) Avail: NTIS HC $3.75 CSCL 05E

Mathematical techniques are described for processing EEG signals associated with varying states of alertness. Fast algorithms for implementing real-time computations of alertness estimates were developed. A realization of the phase-distortionless digital filter is presented which approaches real-time filtering and a transform for EEG signals. This transform provides information for the alertness estimates and can be performed in real time. A statistical test for stationarity in EEG signals is being developed that will provide a method for determining the duration of the EEG signals necessary for estimating the short-time power or energy spectra for nonstationary analysis of EEG signals. Author

N75-11666# New York State Veterinary Coll., Ithaca. Dept. of Physical Biology.
MECHANISM OF CALCIUM ABSORPTION AND TRANSPORT: THE INVOLVEMENT OF THE VITAMIN D-INDUCED CALCIUM-BINDING PROTEIN

A. N. Taylor 1973 11 p refs Presented at the Nutr. Conf., Atlanta, 14 Feb. 1973 Sponsored by AEC
(COO-3167-95; Conf-730229-1) Avail: NTIS HC $3.25

A review of recent developments in the study of calcium absorptive mechanisms emphasizes the end result of vitamin D administration, i.e., the mediation of the calcium absorptive process for which the route of vitamin D, acquired either from dietary sources or from ultraviolet irradiation to the skin, was traced. The process, observed to involve numerous target organs, is shown to induce synthesis of the protein CaBP. The mechanism of delivering these metabolic products to the blood supply is also discussed. Author

N75-11667# Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
DETERMINATION OF THE ADDITIONAL LOAD TO WHICH THE LUNGS OF AN INDIVIDUAL WEARING BREATHING EQUIPMENT ARE EXPOSED
L. Chretien, Y. LeBourdonnec, and B. Werderer Dec. 1973 58 p *refs In FRENCH*
(CEA-N-1681) Avail: NTIS Avail: AEC Depository Libraries HC $6.00

A knowledge of the additional load imposed on the lungs of an individual wearing breathing protection apparatus is important for the determination of what work the wearer of such equipment can be expected to carry out. The different experimental methods proposed in recent research are described and comparisons are made. Investigations made of the behavior of the different apparatus led to the use of analogies between mechanical and electrical laws. Three types of apparatus were studied using a dynamic method. These apparatus are classified in terms of the physical activity exerted by an operator working in a polluted area and the period of time during which he is exposed. NSA

N75-11668# Environmental Health Lab., McClellan AFB, Calif.
INDUSTRIAL HYGIENE EVALUATION OF SPRAY APPLICATIONS OF POLYURETHANE COATINGS
Ronald D. Burnett and Philip Diamond Nov. 1973 68 p refs (EHL Proj. M-HAF-311)
(AD-784843; EHL-M-73M-10) Avail: NTIS CSCL 06/10

The report presents the results of the industrial hygiene evaluations conducted in the aircraft painting facility (Bldg 692) at McClellan AFB, California. The building is a large hangar type structure specifically designed for spray painting aircraft. The building has a downdraft ventilation system with air being supplied through numerous ceiling diffusers and exhausted through floor grills. Painters: exposures or potential exposures to airborne concentrations of organic solvent vapors, hexamethylene diisocyanate (HMDI), toluene diisocyanate, and particulates were determined. The highest exposures to solvent vapors occurred during the cleaning of aircraft surfaces with solvent soaked rags. HMDI was the only contaminant generated in excessive concentrations during the spray painting operations. The adequacy of protective clothing and building ventilation was also studied. (Modified author abstract) GRA

N75-11669# Naval Intelligence Support Center, Washington, D.C. Translation Div.
CONDITIONED CONTROL OF CARDIAC ACTIVITY AND RESPIRATION AND MORPHOLOGICAL CHANGES IN THE BRAIN OF PIGEONS UNDER THE ACTION OF A CONSTANT MAGNETIC FIELD
M. I. Yakovleva and M. V. Medvedeva 31 Jul. 1974 10 p refs Transl. into ENGLISH from Zh. Vyssh. Nerv. Deyatel. (USSR), v. 22, no. 2, 1972 p 288-293
(AD-784798; NISC-Trans-3569) Avail: NTIS CSCL 06/19

Published data indicate that a constant magnetic field (CMF) affects the cardiac-circulatory system of both humans and animals. Exposure to a magnetic field induces changes in the functional states of the higher parts of the central nervous system (CNS). In an organism's complex system of adaptive reactions, an essential role is played by the conditioned reflexes in regulating the vegetative functions. This fact has led to the investigation of the effect of a CMF on the conditioned reflexes in regulating cardiac activity and respiration. GRA

N75-11670*# Scientific Translation Service, Santa Barbara, Calif.
ESTIMATING THE EFFECTIVENESS OF HUMAN WORKING CAPACITY UNDER SPACEFLIGHT CONDITIONS
G. T. Beregovoy, N. V. Krylova, I. B. Solovyeva, and G. P. Shibanov Washington NASA Nov. 1974 16 p *refs* Transl. into ENGLISH from Vop. Psikhologii (USSR), no. 4, Jul. - Aug. 1974 p 3-9 (Contract NASw-2483)
(NASA-TT-F-16019) Avail: NTIS HC $3.25

A theoretical approach to the evalutation of a cosmonaut's psychological reserves and psychophysiological functioning in the space man-machine system is outlined. Due to the greater independence of the man-machine system in space, the cosmonaut must be capable of performing as an observer, operator, repairman and as a working reserve on the spacecraft. The ideal function of the cosmonaut in the latter three roles is described in terms of four basic steps used in human factors engineering: information search, situation evaluation, decision-making, and decision implementation. An extreme situation or accident is the best background for evaluating psychological preparedness; both physical and emotional stress situations are simulated for this purpose, e.g., parachute jumping, escaping submarines by means of torpedo tubes, etc. Correlation of function quality indices with psychophysiological indices will permit prediction of the functional state and emotional behavior of the cosmonaut in space. Author

N75-11671# Pittsburgh Univ., Pa. Dept. of Occupational Health.
NEGATIVE WORK IN EXERCISE STINTS AND SHORT HEAT EXPOSURE FOR ACCLIMATION Final Report, 1 May 1971 - 31 Jul. 1974
Eliezer Kamon and Harwood S. Belding 31 Jul. 1974 23 p refs Sponsored by ONR
(AD-783715) Avail: NTIS CSCL 06/19

Eighteen young adults were subjected to daily treatments of 30 minutes of either light negative and/or moderate to heavy positive work on a laddermill at 22C followed by 30 minutes of either 3.5 mph walk at 50C/25C db/wb room temperatures or sitting under these ambient conditions with additional radiant heat, for four days. Their state of acclimatization was tested by exposure, up to 120 minutes, to 50C/25C db/wb using the following specific criteria: tolerance time (t) to 3.5 mph walk; evelation of heart rate (HR) and rectal temperature (Tre); fall in mean skin temperature (Tsk); and change of sweating. A method of stints of exercise at room temperature followed by short heat exposures might prove an efficient method of acclimatization for large groups when time and hot spaces are wanting. GRA

N75-11672# Technology, Inc., San Antonio, Tex. Life Sciences Div.
TESTING PSYCHOMOTOR PERFORMANCE DURING SUSTAINED ACCELERATION Final Report, 1 Mar. 1971 - 28 Feb. 1973
Stanley C. Collyer Dec. 1973 63 p refs
(Contract F41609-71-C-0009; AF Proj. 9730)
(AD-784936; SAM-TR-73-52) Avail: NTIS CSCL 06/19

Recommendations, developed for the USAF School of Aerospace Medicine (SAM), concern a human psychomotor performance task which could be used to monitor, on a moment-to-moment basis, an operator's ability to perform satisfactorily during sustained acceleration stress. First, a survey was made of the literature on performance testing during G-stress, and/or on the relationship between physiologic and behavioral changes during acceleration. Next, an experimental program was planned and carried out, in which candidate tasks were evaluated under conditions of hypoxia and alcohol intoxication. Final recommendations were then made for: a running memory task to measure a decrement in cognitive skills; and an automated testing system, for installation on the SAM centrifuge, suitable not only for the recommended test but also for many other diversified tasks. Author (GRA)

N75-11673# Sandia Labs., Albuquerque, N.Mex. Systems Studies Div.
MATHEMATICAL MODEL FOR DETERMINING THE PROBABILITY OF VISUAL ACQUISITION OF GROUND

TARGETS BY OBSERVERS IN LOW-LEVEL HIGH-SPEED AIRCRAFT

W. H. Bradford Apr. 1974 22 p refs
(Contract AT(29-1)-789)
(SLA-74-141) Avail: NTIS HC $3.25

A cumulative distribution function for determining the probability of visually acquiring ground targets by observers in low-level high-speed aircraft was formulated as a function of range from target and a number of other parameters believed to have a major influence on target acquisition. Some illustrative calculations are included. Author (NSA)

N75-11674# School of Aerospace Medicine, Brooks AFB, Tex.
FB-3A CREW EVALUATION OF THERMOSTABILIZED BITE-SIZED MEATS Final Report, Jan. - Oct. 1973

Joseph C. Crigler, Donald M. Tucker, John E. Vanderveen, and John H. Hawk Jul. 1974 10 p refs
(AF Proj. 7930)
(AD-784810; SAM-TR-74-12) Avail: NTIS CSCL 06/8

Thermostabilized bite-sized meat items were evaluated under operational conditions by crewmemebers aboard FB-111A aircraft in missions of more than five hours. Food items were: roast beef, ham, and chicken. Results indicated that these bite-sized foods were highly acceptable to the crew, and were suitable for use in a comparatively small cockpit. A few evaluators requested more variety in, and heating of, food--and questioned the nutritional implications of the all-meat fare. Author (GRA)

N75-11676# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
STATIC PROPENSITY OF VARIOUS AIR FORCE GARMENTS Final Report, May - Dec. 1973

Preston C. Opt and Jack H. Ross Jul. 1974 40 p refs
(AF Proj. 7320)
(AD-784789; AFML-TR-74-140) Avail: NTIS CSCL 11/5

The purpose of the tests described in this report was to measure the static propensity of a series of Air Force hospital, flight and ground crew summer and winter garments fabricated of both currently available and experimental fabrics. The results are for assessing the hazards associated with the use of the various materials and materials combinations involved. The scope of the tests was limited to the measurement of static potential (voltage) after body movement, rubbing contact and separation of garments worn by test subjects. Tests were performed in an environmental chamber at 70F, 20-22% RH and 70F, 50-55% RH to demonstrate the role of humidity on static accumulation. All garments were new and tested in the as received condition. (Modified author abstract) GRA

N75-11877* Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF LUNAR SURFACE MATERIAL ON RADIATION DAMAGE IN MICE (INVESTIGATION OF BIOLOGICAL ACTION OF LUNAR SURFACE MATERIAL RETURNED TO EARTH BY LUNA 16 AUTOMATIC STATION)

V. V. Antipov, B. I. Davydov, N. A. Gaydamakin, T. S. Lvova, V. G. Petrukhin, S. N. Komarova, and Ye. B. Skvortsova *In its* Lunar Soil from the Sea of Fertility (NASA-TT-F-15881) Oct. 1974 p 613-626 refs Transl. into ENGLISH from the book "Lunnyy Grunt iz Morya Izobiliya" Moscow, Nauka Press, 1974 p 596-604
CSCL 06C

The effect was studied of lunar surface material from the Sea of Fertility on the radiation reaction (damage) in mice caused by exposure to ionizing radiation. The material was administered to the organism in three ways -- aerogenically, through the esophagus, or peritoneally. It was shown that administering the lunar surface material did not appreciably affect the death of the animals and the reaction of the peripheral blood caused by the action of radiation. In mice which prior to irradiation had been administered inhalationally or peritoneally the lunar surface material, a lag in the increment of bodyweight was observed.
Author

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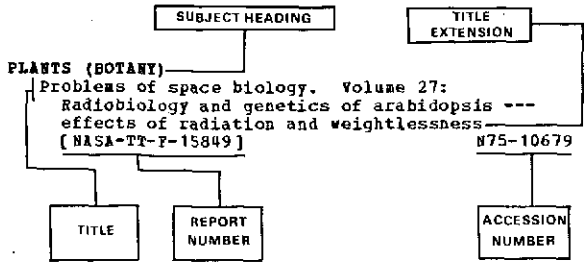

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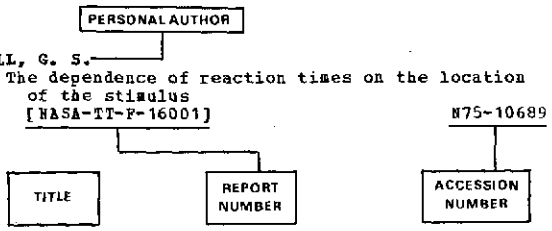

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